LiDAR Project Report

G16PD00164, AR_NRCS-AR LiDAR_2016_B16 QL2 LiDAR

QL2 LiDAR

Prepared For:

United States Geological Survey

Prepared By:

Digital Aerial Solutions, LLC

CONTRACT: #G10PC00093
CONTRACTOR: DIGITAL AERIAL SOLUTIONS
TASK ORDER: # G16PD00164

Project Report
LiDAR Collection, Processing, and QA/QC

AR_NRCS-AR LiDAR_2016_B16 QL2 LiDAR

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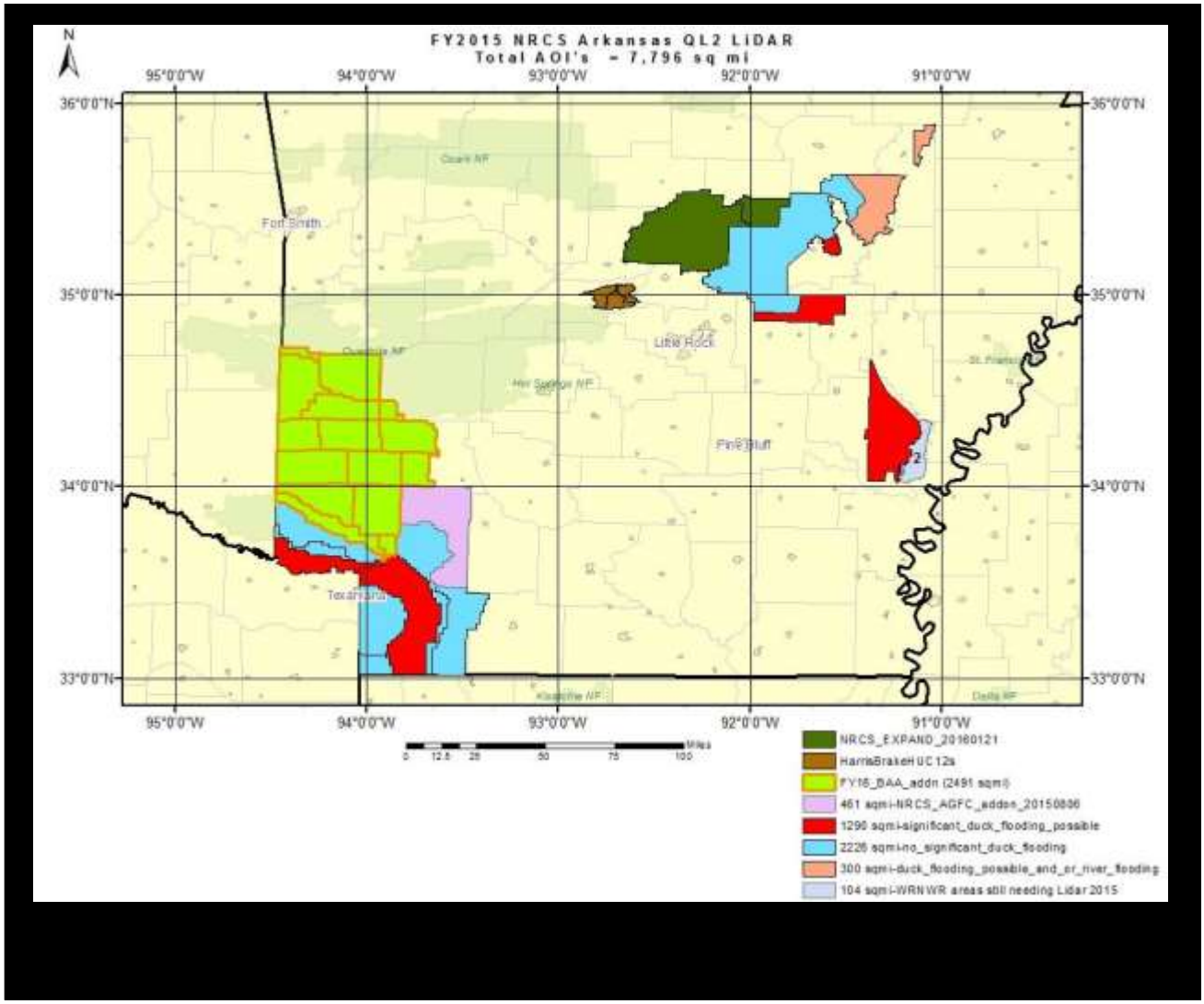
FY2015 NRCS Arkansas QL2 LiDAR
Total AOI's - 7,796 sq mi
N
95°0'0"W
94°0'0"W
93°0'0"W
92°0'0"W
91°0'0"W
36°0'0"N
35°0'0"N
34°0'0"N
33°0'0"N
Ozark NF
Fort Smith
Ouachita NF
Little Rock
Hot Springs NF
Pine Bluff
Texarkana
Kisatchie NF
Delta NF
0 12.5 25 50 75 100 Miles
NRCS_EXPAND_20160121
HarrisBrakeHUC12s
FY16_BAA_addn (2491 sqmi)
461 sqmi-NRCS_AGFC_addon_20150806
1290 sqmi-significant_duck_flooding_possible
2226 sqmi-no_significant_duck_flooding
300 sqmi-duck_flooding_possible_and_or_river_flooding
104 sqmi-WRNWR areas still needing Lidar 2015

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1 Introduction and Specifications

Digital Aerial Solutions, LLC (DAS) was tasked to collect and process a Light Detection And Ranging (LiDAR) derived elevation dataset for the G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR. The area encompasses approximately 7,796 square miles Aerial LiDAR data was collected utilizing an ALS70 and ALS80. The ALS80 is a discrete return topographic LiDAR mapping system manufactured by Leica Geosystems.
LiDAR data collected for the G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR survey has a nominal pulse spacing of 0.7 meters, and includes up to 8 discrete returns per pulse, along with intensity values for each return.

LiDAR datasets were post processed to generate elevation point cloud swaths for each flight line. Deliverables include the point cloud swaths, tiled point clouds classified by land cover type, breaklines to support hydro-flattening of digital elevation models (DEM)s, intensity tiles, and bare-earth DEM tiles. Point cloud deliverables are stored in the LAS version 1.4 format, point data record format 6. The tiling scheme for tiled deliverables is a 1500 meters x 1500 meter grid. Tile number is the appropriate cell number values found in the USNG index. All deliverables were generated in conformance with the *U.S. Geological Survey National Geospatial Program Guidelines and Base Specifications, Version 1.2.*

2 Spatial Reference System

The spatial reference of the data is as follows.

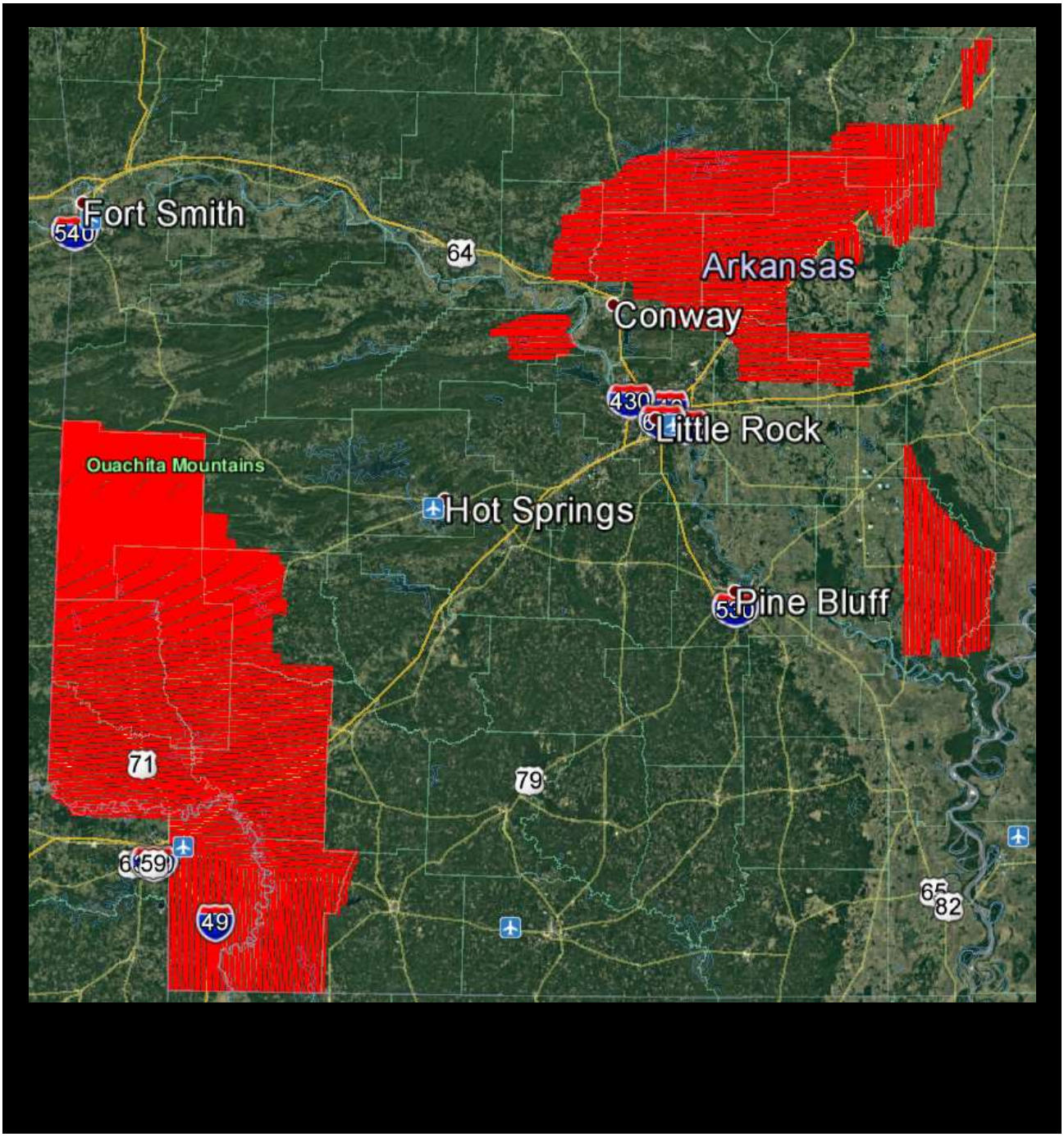
Horizontal Spatial Reference
- Datum: NAVD88, Meters (to 3 decimal places)
- Coordinates: UTM Zone 15, NAD83, Meters (to 2 decimal places);

Vertical Spatial Reference
All datasets are available with orthometric elevation; point cloud datasets are also available with ellipsoid heights
- Datum: North American Vertical Datum of 1983 (GEOID12B)

3 LiDAR Acquisition

3.1 Survey Area

The G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR survey covers approximately 7,796 square miles covering Areas and Counties impacted by the Red River and White River. The flight plan consisted of 479 survey lines and 7 control lines.



3.2 Acquisition Parameters

Acquisition parameters include the sensor configuration and the flight plan characteristics, and are selected based on a number of project specific criteria. Criteria reviewed include the required accuracies for the final dataset, the land cover types within the project survey area, and the required nominal pulse spacing. Acquisition parameters selected for the AR_NRCS-AR_LiDAR_2016_B16 QL2 2ppsm Lidar project are summarized below.

Parameter	Value
Flying Height Above Ground Level	6230 feet
Nominal Sidelap	30%
Nominal Speed Over Ground	155 knots
Field of View	36°
Laser Rate	132 kHz
Scan Rate	66.2 hz
Maximum Cross Track Spacing	0.78 meters
Maximum Along Track Spacing	0.82 meters
Average Spacing	0.7 meters

3.3 Acquisition Mission

The acquisition mission for G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR survey was coordinated to be acquired in 1 month. Due to weather conditions and patterns the collection extended into 2 and a half months. It was determined that the foliage conditions and water levels were too great to continue collection. Collection began on Feb 16th 2016 and was completed on April 2nd, 2016.

3.4 Airborne GPS/IMU

Airborne global positioning system (GPS) and inertial measurement unit (IMU) data was collected on the aircraft during the acquisition mission, providing sensor position and orientation information for geo-referencing the LiDAR data. Airborne GPS observations were collected at a frequency of 2Hz, and IMU observations are collected at a frequency of 200Hz.

Aircraft	Sensor	GPS Lever Arm (m)	IMU Lever Arm (m)
C421 – N112MJ	ALS70 – SN1132	x: -0.210, y: -0.060, z: -1.370	x: -0.450, y: -0.159, z: -0.169

In addition, GPS data was collected with ground base stations during the acquisition mission, providing corrections to support differential post-processing of the airborne GPS. One ground base station was setup at an NGS Benchmark as the base of operation. The additional ground base station were selected and place threw the project to ensure complete coverage. Ground GPS observations were collected at a frequency of 2Hz.

4 LiDAR Processing

4.1 Acquisition Post-Processing

Once the acquisition was completed, initial post-processing was performed to generate geo-referenced LiDAR elevation point clouds.

The airborne GPS dataset was differentially corrected using the ground base station GPS datasets collected by DAS in Lecia's INERTIALEXPLORER software. INERTIALEXPLORER computes the GPS dataset corrections in both forward and reverse chronological sequence, obtaining two solutions for the GPS trajectory. The differences between these two solutions were reviewed to ensure a consistent result, and agree within +/- 3cm. The forward and reverse solutions also show good fit between the two different base stations used in the post-processing.

Differentially corrected airborne GPS data was merged with the airborne IMU dataset in Leica's INERTIALEXPLORER software through Kalman filtering techniques. INERTIALEXPLORER applies the reference lever arms for the GPS and IMU measurement systems during processing to determine the trajectory (position and orientation) of
the LiDAR sensor during the acquisition mission. Estimated lever arm values reported posteriori validate the measurements made during sensor installation in the aircraft.

Raw LiDAR sensor ranging data and the final sensor trajectory from INERTIALEXPLORER were processed in Leica's ALSPP software to produce the LiDAR elevation point cloud swaths for each flightline, stored in LAS version 1.4 file format. Quality control of the swath point clouds was performed to validate proper function of the sensor systems, full coverage of the project AOI, and point density consistent with the planned nominal pulse spacing.

Swath point clouds were assigned a unique File Source ID within the LAS file format before further processing. Swath files for the G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR project were numbered in chronological order of acquisition.

4.2 Geometric Calibration

Geometric and positional accuracy of the LiDAR swath point clouds is highly dependent on accurate calibration of the various subsystems within the LiDAR sensor system. Sensor calibration parameters fall into two categories, one being those parameters proprietary to the manufacturer's sensor design, and the other being parameters common to most commercial airborne LiDAR sensors, the IMU to laser reference system alignment angles (bore-site), and mirror deformation constants (scaling).

The manufacturer specific calibration parameters are applied in Leica's Cloud Pro software for the ALS80 sensor system. Terrasolid's Terramatch software was used to calculate the IMU bore-site and mirror scale parameters for the G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR. Within the TerraMatch software, the Tie- line workflow was used to solve for the parameters. The Tie-line workflow involves automated selection of numerous 'tie-lines', which represent a linear segment fit to the data that should have the same slope, azimuth, position and elevation, within the overlap sections of the survey lines and control lines. The tie- lines provide observations for algorithms within TerraMatch to solve for the bore-site and mirror scale parameters for the lift.

The Tie-line workflow is dependent upon well distributed tie-lines throughout the swath point clouds to effectively solve for bore-site and mirror scale parameters with the automated algorithms.

survey and control lines. Manual estimation of the bore-site and mirror scale parameters was performed using the observed tie-lines in overlap areas.

The final step of geometric calibration is to determine elevation (z) offset corrections to be applied to the swath point clouds. Z values calculated during the course of the acquisition mission can vary at the centimeter level as the GPS satellite constellation observed in the survey area changes with satellites moving through their orbits over the course of the mission. Baseline length from the ground base station GPS to the airborne GPS can also impact the z values calculated for the swath point clouds. Z offset corrections are calculated in two steps; a relative step, where individual lines are corrected one to another using the adjusted tie-lines from the bore-site and mirror scale calculation step; and an absolute step, where groups of lines are leveled to project ground control.

For the G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR project, the control lines were used to determine relative z offset corrections in areas of discernible ground. The base station operated by DAS in the survey area provided for minimal baseline lengths, resulting in generally good z agreement between the survey lines and control lines.

The final geometrically calibrated swath point clouds were compared to the bare-earth profile survey data. The data fit the profile surveys within the vertical accuracy tolerance specified for the project. Full documentation of the vertical accuracy checks maybe found in section 5.1.

4.3 Point Cloud Classification

Georeference information was applied to the swath point could LAS files. Geometrically calibrated swath point clouds were cut into USNG index, 1500 meter x 1500 meter LAS 1.4 format tiles for point cloud classification and derived product creation.

Tiled point cloud data was processed in Terrasolid's Terrascan software to assign initial classification values. The Terrascan software provides a number of routines to algorithmically detect and assign points to their appropriate class. Points left unclassified by the algorithmic routine remain as Class 1 – Processed, but unclassified. Automated classification routines assigned points to one of the following classes:

Class 1 – Processed, but unclassified
Class 2 – Bare-earth ground
Class 7 – Low Noise (low, manually identified, if necessary)
Class 9 — Water
Class 10 — Ignored Ground (Breakline Proximity)
Class 17 — Bride Decks
Class 18 – High Noise (high, manually identified, if necessary)

Automated classification results were reviewed for each tiled point cloud, and manual edits made where necessary to correct for misclassified points. Points remaining in Class 1 after the automated classification routines were run were left in Class 1. Points falling outside of a 100 meter buffer of the project AOI polygon were excluded from the tiled point clouds.

4.4 Breakline Collection

Manual breakline collection was performed to support the hydro-flattening requirements of the project's DEM deliverables. Breaklines were collected directly from the classified point clouds and from triangulated irregular network (TIN) surface models built from the classified point clouds, in Terrasolids's Terrascan and Terramodeler software. Breakline features were collected as design file elements in Bentley's Microstation software. Breaklines were converted to ESRI 3D shapefile format for the breakline deliverable, and tiled to USNG index.

The data collected for the G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR survey maintained significant point density in the water, limiting the usefulness of point density as guiding factor in breakline placement.

Points classified as Class 2 – Bare-earth ground, falling within a one meter buffer of the collected breaklines, were reassigned to Class 10 – Ignored Ground. These points are excluded from the surface model during DEM generation to preserve the hydro-flattening characteristics of the breaklines.

4.5 DEM Generation

The final classified point clouds and collected breaklines were reviewed for completeness and conformance to the task order scope of work. Within the Terramodeler software, points in Class 2 – Bare-earth ground and the breaklines were combined to generate TIN elevation models for each tile, from which the bare-earth DEM tiles were interpolated and exported as 32 bit raster IMG format.

5 Quality Control

5.1 Point Clouds

Accuracy and completeness of the LiDAR point clouds directly impacts the quality of all other derived LiDAR derived products. Ensuring a quality LiDAR dataset begins with proper mission planning and execution. Ground GPS base stations are located such that GPS baselines between the ground and airborne receivers do not exceed 30km. For the G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR project, two base stations were run to meet this requirement, one at the field operations airport and one within the survey area. Static alignment is performed both before take-off and after landing to allow for GPS integer ambiguity resolution. Sensor operators carefully monitor the LiDAR unit and its various subsystems during the acquisition mission to ensure proper function. Airborne GPS positional dilution of precision (PDOP) estimates are monitored to ensure they remain less than 3.The optical system is monitored to ensure there are no ranging errors encountered during the flight lines.

During acquisition post-processing estimates of the trajectory data accuracy are reviewed to ensure they will support the required accuracies of the point cloud data. The trajectory accuracy is a function of the differentially corrected GPS data and the IMU data.

The raw swath point clouds generated from CloudPro are reviewed as another check for proper sensor function. The point clouds are reviewed for full coverage of the AOI, required point density and nominal pulse spacing, clustering, proper intensity values, full swath coverage within the planned field of view, and planned survey line overlap.

Geometric calibration quality control validates that the positional accuracy requirements of the project are met, and includes relative accuracy assessments for intra-swath (within) and inter-swath (between) accuracy, along with absolute accuracy assessments against project ground control.

Relative vertical accuracy assessments are normally made using the tie-lines generated in the Terramatch software, as these lines provide positional observations throughout the extent of individual swaths, and between neighboring swaths.

There is not a systematic method of testing when testing horizontal accuracy in LiDAR. The estimated Horizontal accuracy at one sigma based on the flying height for the project, is between 10cm and 20cm according to manufacturer specifications.

Absolute vertical accuracy assessments for the point cloud data are made against ground check point data. For the G16PD00164, AR_NRCS-AR_LiDAR_2016_B16 QL2 LiDAR, ground check point data consisted of the ground GPS base station, and real-time kinematic (RTK) GPS techniques.

Check point locations were collected at 1 – second intervals during the RTK survey. Points collected during the static pre-initialization and post-initialization were removed from the assessment so as not to bias the assessment.

Local TIN models of the elevation points are built around each ground check points. The tin model elevation is sampled at the horizontal position of the ground check point. The TIN model elevation and ground check point survey elevation values were used to calculate the fundamental vertical accuracy (FVA) of the swath point clouds. The NVA of the TIN tested RMSEz 0.079 meters and 0.154 meters at the 95% confidence level in open terrain. NVA of the DEM tested at an RMSEz of 0.079 meters and 0.156 meters at the 95% confidence level in open terrain. The full calculations for all check points can be found in Appendix B.

FVA of TIN

$RMSE_Z$ =	0.079	meters
NSSDA=	0.154	meters

FVA of DEM

$RMSE_Z$ =	0.079	meters
NSSDA=	0.156	meters

The tiled point cloud products were reviewed for full coverage of the AOI and proper classification. As part of the QC process, TINs are built in the Terramodeler software for each tile using the ground class and the hydro-flattening breaklines. The TINs are reviewed for non-ground features, and edited where necessary to remove any remaining non-ground features. Points were also reviewed for absolute elevation, and points falling below the selected orthometric elevation for water were removed from the ground class.

5.2 Breaklines

The final breaklines in ESRI 3D shapefile format were reviewed for topological consistency and correct elevation. Breaklines features are continuous and do not have overlaps or dangles.

5.3 Digital Elevation Models

Digital elevation models (DEMs) were reviewed for conformance with the SOW and the Base Mapping Specification version 1.2 guidelines. DEM files were loaded in the Global Mapper software and inspected visually for edge matching between tiles, void areas within the project AOI, and proper coding of the NODATA values. DEM file naming was verified for consistency with the USNG index.

5.4 Intensity Images

Intensity Imagery was produced to match the tiles scheme of the LAS and DEM, including the pixel size at 1 meter posting. For one of the flights the intensity return from the sensor was not recorded properly and the values produced are scaled and washed out. Leica was notified of the issue and working along with DAS to correct the intensity values.

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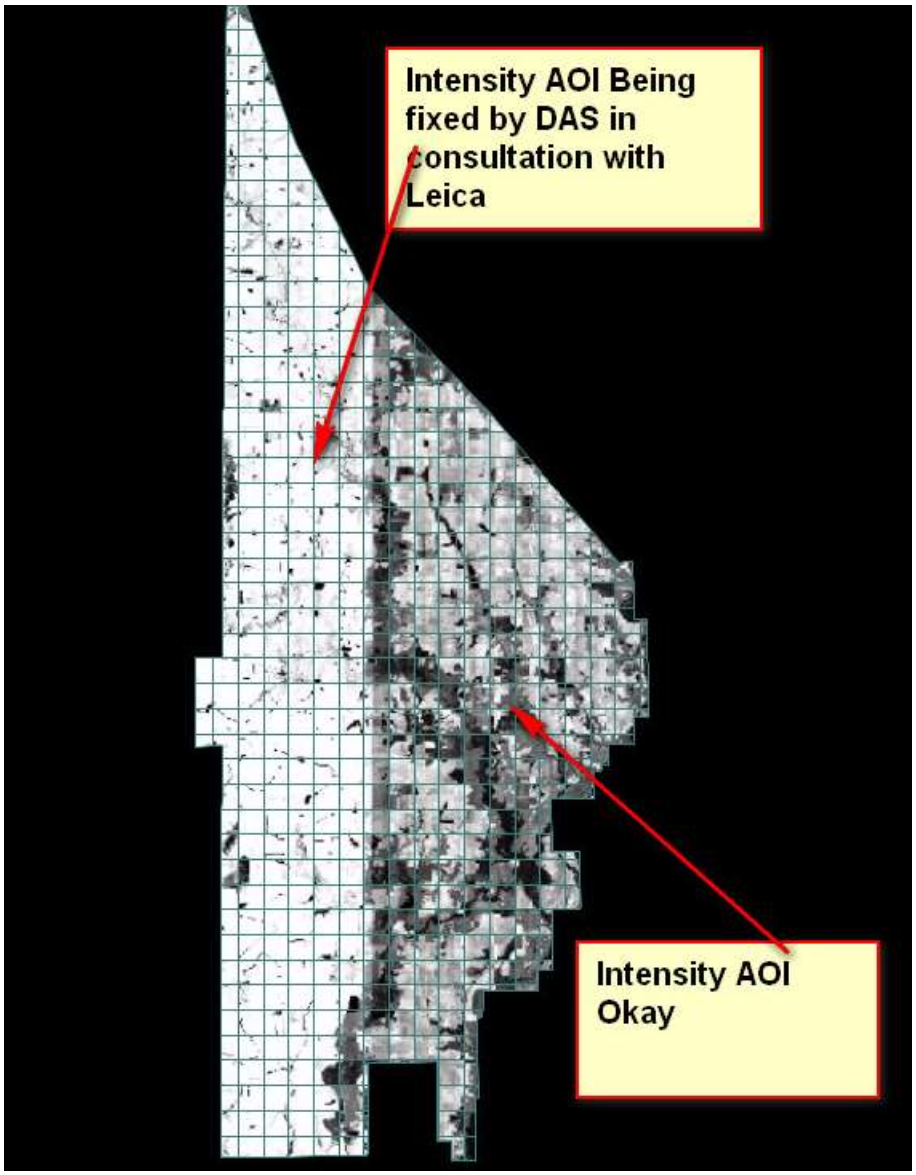

Appendix A. Flight Logs

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	SN 8235						**Sensor Operator/s**	
									-		Bertin Evina-Ze	
Date/Julian:	2/16/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**	**Pilot/s**	
Hobbs End	3082.7			3-808654C			155			DH2716	MWAZ	
Hobbs ST	3080.4		LIFT	**704**			**TAR ALT AGL (ft):**	**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	2.3		**A**				6,130-6,340	AR_ALS80_NCRS		1.500	421C 13RF	CXW(Conway, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
A									597				
	1	X05	160217_004559	24:45	24:51	6,200	90	155	595	17	1.2	0.7	**X-STRIP**
	2	40	160217_005900	24:59	1:09	6,270	0	154	590	19	1.1	0.5	
	3	39	160217_011353	1:13	1:24		180	157	586	16	1.4	0.6	
	4	38	160217_012934	1:29	1:39		0	154	581	17	1.2	0.6	
	5	33	160217_014509	1:45	1:55		180	155	577	18	1.1	0.6	
	6	32	160217_020048	2:00	2:11		0	155	572	15	1.2	0.7	**Clouds 7nm to end-Rfly**
	7	X02	160217_021737	2:17	2:22		90	158	570	15	1.2	0.7	**X-STRIP**

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	**SN 8235**						**Sensor Operator/s**	
									-		Wes Blankenship	
Date/Julian:	2/17/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**	**Pilot/s**	
Hobbs End	3092.2			3-808654C			155			TEMP	MWAZ	
Hobbs ST	3087.4		LIFT	**704**			**TAR ALT AGL (ft):**	**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	4.8		**A**				6,130-6,340	AR_ALS80_NCRS		1.500	421C 13RF	CXW(Conway, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
A													
	1	X05	160217_203358	20:33	20:36	6,200	90	155	507	14	1.2	0.7	**X-STRIP**
	2	31	160217_204339	20:43	20:54		0	156	503	13	1.5	0.9	
	3	30	160217_205848	20:58	21:08		180	154	499	13	1.3	0.9	
	4	29	160217_211519	21:15	21:24		0	155	495	15	1.1	0.7	
	5	28	160217_212833	21:28	21:37		180	155	491	15	1.2	0.7	
	6	27	160217_214129	21:41	21:50		0	156	487	14	1.1	0.8	
	7	26	160217_215508	21:55	22:03		180	157	483	16	1.1	0.6	
	8	25	160217_220742	22:07	22:15		0	155	480	16	1.2	0.6	
	9	24	160217_222018	22:20	22:28		180	155	476	18	1.4	0.6	
	10	23	160217_223213	22:32	22:40		0	155	473	17	1.1	0.6	
	11	32	160217_224615	22:46	22:56		180	157	468	16	1.3	0.6	**Refly**
	12	34	160217_230038	23:00	23:10		0	155	463	15	1.5	0.6	
	13	35	160217_231508	23:15	23:25		180	156	459	15	1.4	0.6	
	14	36	160217_233033	23:30	23:40		0	157	455	17	1.1	0.6	
	15	37	160217_234510	23:45	23:55		180	156	451	17	1.1	0.6	
	16	041	160218_000042	24:00	24:12		0	157	445	15	1.3	0.7	
	17	042	160218_001710	24:17	24:29		180	155	440	16	1.2	0.6	
	18	X04	160218_003932	24:39	24:44		270	157	438	15	1.4	0.7	**X-STRIP**
	19	X03	160218_004730	24:47	24:51	6,182	90	154	436	17	1.2	0.6	**X-STRIP**

DAS
Digital Aerial Solutions

ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	SN 8235						**Sensor Operator/s**	
									-		Wes Blankenship	
Date/Julian:	2/18/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**	**Pilot/s**	
Hobbs End	3095.5			3-808654C			155			TEMP	Mike Millard	
Hobbs ST	3092.5		LIFT	**704**			**TAR ALT AGL (ft):**	**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	3.0		**A**				6,130-6,340	AR_ALS80_NCRS		1.500	421C 13RF	SRC(Searcy, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
A													
	1	X02	160218_210221	21:02	21:08	6,200	90	155	436	16	1.1	0.7	**X-STRIP**
	2	112	160218_211715	21:17	21:23		180	154	430	15	1.2	0.7	
	3	111	160218_212725	21:27	21:33		0	157	427	15	1.2	0.7	
	4	110	160218_213858	21:38	21:45		180	154	424	14	1.4	0.7	
	5	109	160218_214907	21:49	21:55		0	155	421	15	1.3	0.6	
	6	108	160218_215926	21:59	22:08		180	155	417	16	1.1	0.6	
	7	107	160218_221051	22:10	22:18		0	155	414	17	1.1	0.6	
	8	106	160218_222242	22:22	22:31		180	155	410	16	1.2	0.6	
	9	105	160218_223429	22:34	22:42		0	155	406	15	1.4	0.6	
	10	104	160218_224644	22:46	22:55		180	155	402	15	1.4	0.7	
	11	103	160218_225912	22:59	23:01		0	155		16	1.2	0.7	**Miision Abort**
													Aircraft issue

DAS Digital Aerial Solutions

ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**		**ALS80_HP**	SN 8235							**Sensor Operator/s**	
									-		Bertin Evina-Ze	
Date/Julian:	2/26/2016		**Disk Drive MM70**			**TAR AIRSPD (KNTS)**				**Base PID:**	**Pilot/s**	
Hobbs End	1230.6		3-808654C			145				TEMP	Mike Millard	
Hobbs ST	1226.0	LIFT	**704**			**TAR ALT AGL (ft):**		**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	4.6	**A**				6,400		AR_ALS80_NCRS		1.500	421C 112MJ	SRC(Searcy, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
A									400				
	1	X04	160226_154314	15:43	15:50	6,400	90	145	397	19	1.1	0.6	**X-STRIP**
	2	J100	160226_155543	15:55	16:04		0	146	394	20	1.0	0.6	
	3	J099	160226_160757	16:07	16:16		180	144	390	19	1.1	0.6	
	4	J098	160226_161955	16:19	16:28		0	143	387	19	1.1	0.6	
	5	J097	160226_163101	16:31	16:39		180	144	383	19	1.1	0.6	
	6	J096	160226_164240	16:42	16:50		0	145	379	18	1.2	0.6	
	7	J095	160226_165317	16:53	17:00		180	146	376	17	1.3	0.7	
	8	J094	160226_170356	17:03	17:10		0	147	374	17	1.2	0.7	
	9	J093	160226_171250	17:12	17:19		180	145	371	17	1.2	0.7	
	10	J092	160226_172219	17:22	17:29		0	146	368	17	1.2	0.7	
	11	J091	160226_173206	17:32	17:39		180	145	365	17	1.1	0.6	
	12	J090	160226_174216	17:42	17:50		0	147	362	18	1.0	0.6	
	13	J089	160226_175251	17:52	18:00		180	146	358	17	1.0	0.7	
	14	J088	160226_180402	18:04	18:12		0	145	355	15	1.2	0.7	
	15	J087	160226_181453	18:14	18:23		180	147	351	14	1.3	0.8	
	16	J086	160226_182556	18:25	18:34		0	146	347	16	1.1	0.7	
	17	J085	160226_183742	18:37	18:46		180	146	344	15	1.2	0.7	
	18	J084	160226_184910	18:49	18:58		0	145	340	14	1.3	0.8	
	19	X02	160226_190600	19:06	19:10		270	140	338	15	1.2	0.7	**X-STRIP**
	20	J083	160226_191510	19:15	19:24		180	145	334	14	1.3	0.7	

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	SN 8235							**Sensor Operator/s**	
										-		Bertin Evina-Ze	
Date/Julian:	2/26/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**				**Base PID:**	**Pilot/s**	
Hobbs End	1234.7			3-808654C			145				TEMP	MWAZ	
Hobbs ST	1230.6		LIFT	**704**			**TAR ALT AGL (ft):**		**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	4.1		**B**				6,400		AR_ALS80_NCRS		1.500	421C 112MJ	SRC(Searcy, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
B									333				
	1	X07	160226_204225	20:42	20:48	6,400	270	146	331	14	1.2	0.7	**X-STRIP**
	2	J142	160226_205638	20:56	20:59		0	145	330	14	1.3	0.7	
	3	J141	160226_210238	21:02	21:05		180	145	329	14	1.3	0.7	
	4	J140	160226_210848	21:08	21:11		0	145	328	14	1.3	0.7	
	5	J139	160226_211434	21:14	21:17		180	144	327	15	1.3	0.7	
	6	J138	160226_212039	21:20	21:23		0	146	325	15	1.2	0.7	
	7	J137	160226_212605	21:26	21:28		180	146	324	15	1.2	0.7	
	8	J081	160226_213241	21:32	21:48		0	145	318	14	1.3	0.7	
	9	J080	160226_215158	21:51	22:07		180	146	311	16	1.1	0.6	
	10	J079	160226_221011	22:10	22:25		0	144	305	16	1.4	0.7	
	11	J078	160226_222817	22:28	22:43		180	143	298	15	1.4	0.7	
	12	J077	160226_224630	22:46	23:01		0	145	292	16	1.3	0.6	
	13	J076	160226_230420	23:04	23:19		180	146	285	16	1.2	0.6	
	14	J075	160226_232215	23:22	23:37		0	145	279	15	1.4	0.7	
	15	J074	160226_234003	23:40	23:55		180	147	272	17	1.2	0.6	
	16	J082	160227_000231	24:02	24:12		0	145	268	17	1.2	0.6	
	17	X02	160227_001648	24:16	24:19		270	144	267	19	1.1	0.6	**X-STRIP**

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**		**ALS80_HP**	SN 8235							**Sensor Operator/s**	
									-		Bertin Evina-Ze	
Date/Julian:	2/27/2016		**Disk Drive MM70**			**TAR AIRSPD (KNTS)**				**Base PID:**	**Pilot/s**	
Hobbs End	1234.7		3-808654C			145				TEMP	Mike Millard	
Hobbs ST	1230.6	LIFT	**704**			**TAR ALT AGL (ft):**		**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	4.1	**A**				6,400		AR_ALS80_NCRS		1.500	421C 112MJ	SRC(Searcy, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
A									267				
	1	X06	160227_150918	15:09	15:12	6,400	270	146	266	18	1.1	0.6	**X-STRIP**
	2	J072	160227_152107	15:21	15:36		0	146	259	19	1.1	0.6	
	3	J071	160227_153858	15:38	15:54		180	147	253	20	1.0	0.6	
	4	J070	160227_155647	15:56	16:11		0	148	246	18	1.1	0.6	
	5	J069	160227_161434	16:14	16:30		180	145	239	19	1.1	0.6	
	6	J068	160227_163245	16:32	16:48		0	147	233	18	1.1	0.6	
	7	J067	160227_165051	16:50	17:06		180	147	226	16	1.3	0.8	
	8	J066	160227_170913	17:09	17:24		0	145	219	16	1.2	0.7	
	9	J065	160227_172714	17:27	17:42		180	146	213	16	1.1	0.6	
	10	J064	160227_174631	17:46	18:01		0	144	207	17	1.0	0.6	
	11	J063	160227_180354	18:03	18:17		180	145	201	14	1.3	0.7	
	12	J062	160227_182132	18:21	18:35		0	144	195	16	1.2	0.7	
	13	X02	160227_184152	18:41	18:45		270	143	193	14	1.3	0.7	**X-STRIP**
	14	J061	160227_185014	18:50	19:03		180	143	188	15	1.2	0.7	

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	SN 8235							**Sensor Operator/s**	
										-		Bertin Evina-Ze	
Date/Julian:	2/27/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**				**Base PID:**	**Pilot/s**	
Hobbs End	1242.9			3-808654C			145				TEMP	MWAZ	
Hobbs ST	1239.1		LIFT	**704**			**TAR ALT AGL (ft):**		**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	3.8		**B**				6,400		AR_ALS80_NCRS		1.500	421C 112MJ	SRC(Searcy, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
B									187				
	1	X06	160227_202438	20:24	20:31	6,400	270	144	184	15	1.3	0.8	**X-STRIP**
	2	J073	160227_204316	20:43	20:58		0	146	177	14	1.2	0.7	
	3	X02	160227_210256	21:02	21:08		270	145	175	15	1.3	0.7	**X-STRIP**
	4	J060	160227_211427	21:14	21:27		180	148	169	16	1.1	0.6	
	5	J059	160227_213044	21:30	21:44		0	145	164	16	1.2	0.6	
	6	J058	160227_214656	21:46	22:00		180	147	158	18	1.1	0.6	
	7	J057	160227_220253	22:02	22:15		0	144	153	17	1.2	0.6	
	8	J056	160227_221915	22:19	22:31		180	147	147	16	1.4	0.6	
	9	J055	160227_223437	22:34	22:46		0	145	142	16	1.4	0.6	
	10	J054	160227_225053	22:50	22:51		180	145	143	18	1.1	0.6	**ABORT..center**
	11	J054	160227_225725	22:57	23:09		0	146	137	18	1.2	0.6	
	12	J053	160227_231311	23:13	23:24		180	145	132	16	1.3	0.6	
	13	J052	160227_232753	23:27	23:39		0	145	127	18	1.1	0.6	
	14	J051	160227_234305	23:43	23:45		180	147	126	18	1.2	0.6	**ABORT Clouds**

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**		**ALS80_HP**	SN 8235							**Sensor Operator/s**	
									-		Bertin Evina-Ze	
Date/Julian:	2/28/2016		**Disk Drive MM70**			**TAR AIRSPD (KNTS)**				**Base PID:**	**Pilot/s**	
Hobbs End	1245.5		3-808654C			145				TEMP	Mike Millard	
Hobbs ST	1242.9	LIFT	**704**			**TAR ALT AGL (ft):**		**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	2.6	**A**				6,400		AR_ALS80_NCRS		1.500	421C 112MJ	SRC(Searcy, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
A									125				
	1	X06	160228_150359	15:03	15:08	6,400	270	140	123	19	1.0	0.6	**X-STRIP**
	2	J041	160228_151250	15:12	15:25		0	146	117	17	1.2	0.7	
	3	J042	160228_153101	15:31	15:44		180	142	112	19	1.1	0.6	
	4	J043	160228_154911	15:49	16:02		0	146	106	20	1.1	0.6	
	5	J044	160228_160741	16:07	16:20		180	146	101	20	1.0	0.5	
	6	J045	160228_162403	16:24	16:36		0	147	96	18	1.1	0.6	
	7	J046	160228_164047	16:40	16:53		180	140	91	16	1.3	0.7	
	8	J051	160228_165807	16:58	16:58		0	144	90	16	1.3	0.7	**Abort weather**
	9	X04	160228_170647	17:06	17:09		270	133	89	15	1.3	0.7	**X-STRIP**

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	SN 8235							**Sensor Operator/s**	
									-			Bertin Evina-Ze	
Date/Julian:	3/22/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**		**Pilot/s**	
Hobbs End	1245.5			3-808654C			145			TEMP		Mike Millard	
Hobbs ST	1242.9		LIFT	**706**			**TAR ALT AGL (ft):**		**Flight Plan(s):**	**Base Height:**	**Aircraft**	**Airport Idnt:**	
Flight Time	2.6		**A**				6,400		AR_ALS80_NCRS	1.500	421C 112MJ	SRC(Searcy, AR)	

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
A									225				
	1	X04	160322_183739	18:37	18:41	6,500	270	140	222	15	1.3	0.8	**X-STRIP**
	2	J047	160322_185110	18:51	19:04		180	146	218	18	1.0	0.6	
	3	J048	160322_190738	19:07	19:20		0	142	212	15	1.2	0.7	
	4	J049	160322_192419	19:24	19:37		180	146	207	16	1.3	0.7	
	5	J050	160322_194016	19:40	19:51		0	146	202	18	1.1	0.6	
	6	J051	160322_195551	19:55	20:07		180	147	197	18	1.1	0.6	
	7	X06	160322_201252	20:12	20:14		270	140	196	19	1.1	0.6	**X-STRIP**

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	SN 8235							**Sensor Operator/s**	
									-			Bertin Evina-Ze	
Date/Julian:	3/24/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**		**Pilot/s**	
Hobbs End	98.6			3-808654C			145			TEMP		MWAZ	
Hobbs ST	95.6		LIFT	**706**			**TAR ALT AGL (ft):**	**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**	
Flight Time	3.0		**A**				6,400	AR_ALS80_NCRS		1.500	421C 13RF	SRC(Searcy, AR)	

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
A									195				
	1	F01	160325_023932	2:39	2:44	6,400	270	150	193	16	1.1	0.7	
	2	F02	160325_024839	2:48	2:53		90	151	191	16	1.2	0.7	
	3	F03	160325_025859	2:58	3:04		270	149	189	17	1.1	0.6	
	4	F04	160325_030841	3:08	3:13		90	150	187	17	1.2	0.7	
	5	F05	160325_031800	3:18	3:23		270	150	185	16	1.2	0.7	
	6	F06	160325_032730	3:27	3:32		180	150	184	16	1.2	0.7	
	7	F07	160325_033711	3:37	3:42		270	150	182	16	1.2	0.7	
	8	F08	160325_034619	3:46	3:51		90	150	180	17	1.1	0.6	
	9	F09	160325_035615	3:56	4:01		270	150	177	17	1.2	0.7	
	10	F10	160325_040548	4:05	4:11		90	150	175	17	1.2	0.7	
	11	F11	160325_041718	4:17	4:27		270	150	171	16	1.3	0.7	
	12	F12	160325_043124	4:31	4:39		90	150	168	16	1.3	0.7	
	13	F13	160325_044420	4:44	4:52		270	150	164	15	1.7	0.8	
	14	F14	160325_045721	4:57	5:05		180	150	161	18	1.3	0.6	
	15	F15	160325_051035	5:10	5:19		270	150	157	17	1.3	0.6	
	16	X11	160325_053017	5:30	5:34		182	150	156	16	1.3	0.7	**X-STRIP**

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	SN 8235							**Sensor Operator/s**	
									-			Bertin Evina-Ze	
Date/Julian:	3/25/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**		**Pilot/s**	
Hobbs End	3102.5			3-808654C			155			TEMP		Mike Millard	
Hobbs ST	3099.4		LIFT	**706**			**TAR ALT AGL (ft):**	**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**	
Flight Time	3.1		**A**				6,130-6,340	AR_ALS80_NCRS		1.500	421C 13RF	CXW(Conway, AR)	

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
A									155				
	1	X10	160325_215826	21:58	22:02	6,360	180	150	154	17	1.2	0.6	**X-STRIP**
	2	H15	160325_220636	22:06	22:10	6,675	262	151	152	18	1.2	0.6	
	3	H14	160325_221457	22:14	22:19	6,540	82	150	150	18	1.2	0.6	
	4	H13	160325_222412	22:24	22:29	6,300	262	150	148	19	1.1	0.6	
	5	H12	160325_223336	22:33	22:38		82	151	146	18	1.2	0.6	
	6	H11	160325_224319	22:43	22:48		262	150	144	17	1.4	0.7	
	7	H10	160325_225312	22:53	22:57		82	149	141	18	1.3	0.6	
	8	H09	160325_230219	23:02	23:07		262	151	140	18	1.2	0.6	
	9	H08	160325_231115	23:11	23:15		82	147	138	19	1.1	0.6	
	10	H07	160325_231934	23:19	23:24		262	150	136	18	1.1	0.6	
	11	H06	160325_232824	23:28	23:34		82	152	133	17	1.2	0.6	
	12	H05	160325_233836	23:38	23:44		262	152	131	18	1.0	0.6	
	13	H04	160325_234901	23:49	23:55		82	150	128	17	1.1	0.7	
	14	H03	160325_235934	23:59	24:05		262	150	125	15	1.3	0.7	
	15	H02	160326_001049	24:10	24:15		82	151	123	16	1.2	0.7	
	16	H01	160326_002008	24:20	24:24		262	150	121	16	1.1	0.7	
	17	X09	160326_002854	20:28	24:32		183	150	120	16	1.1	0.7	**X-STRIP**

DAS Digital Aerial Solutions

ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	**SN 8235**						**Sensor Operator/s**	
									-		Bertin Evina-Ze	
Date/Julian:	3/26/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**	**Pilot/s**	
Hobbs End	3196.9			3-808654C			145			TEMP	Mike Millard	
Hobbs ST	3192.8		LIFT	**706**			**TAR ALT AGL (ft):**	**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	4.1		**A**				6,400	AR_ALS80_NCRS		1.500	421C 13RF	SRC(Searcy, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude: ASL:**	**Direction**	**Speed: kts:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**				**MM Space**		**PDOP**	**HDOP**	
A									120				
	1	X12	160326_154851	15:48	15:50	6,266	180	150	119	18	1.0	0.6	**X-STRIP**
	2	F17	160326_155432	15:54	15:56		270	151	118	17	1.1	0.6	
	3	F16	160326_160013	16:00	16:01		90	150	117	17	1.1	0.6	
	4	B106	160326_161041	16:10	16:12	6,400	0	145	117	16	1.2	0.7	
	5	B105	160326_161629	16:16	16:19		180	144	116	15	1.4	0.8	
	6	B104	160326_162246	16:22	16:26		0	145	114	16	1.2	0.7	
	7	B103	160326_163105	16:31	16:34		180	143	113	16	1.3	0.7	
	8	B102	160326_163754	16:37	16:40		0	146	112	16	1.3	0.7	
	9	B101	160326_164520	16:45	16:48		180	145	111	15	1.4	0.8	
	10	B100	160326_165158	16:51	16:54		0	146	110	15	1.4	0.8	
	11	B099	160326_165906	16:59	17:01		180	145	109	16	1.3	0.7	
	12	B098	160326_170516	17:05	17:07		0	147	108	16	1.2	0.7	
	13	B097	160326_171219	17:12	17:13		180	146	108	16	1.2	0.7	
	14	X05	160326_171811	17:18	17:20		90	151	107	15	1.3	0.7	**X-STRIP**
	15	X04	160326_172349	17:23	17:26		270	151	106	15	1.3	0.7	**X-STRIP**
	16	J108	160326_173214	17:32	17:38		0	145	103	15	1.3	0.7	
	17	J109	160326_174357	17:43	17:50		180	145	100	15	1.2	0.7	
	18	J110	160326_175653	17:56	18:02		0	146	98	15	1.1	0.7	
	19	J111	160326_180803	18:08	18:13		180	145	95	15	1.2	0.7	
	20	J112	160326_181748	18:17	18:22		0	146	93	14	1.3	0.8	
	21	J113	160326_182802	18:28	18:32		180	146	91	17	1.1	0.6	
	22	J114	160326_183703	18:37	18:40		0	147	89	17	1.1	0.6	
	23	J115	160326_184613	18:46	18:48		180	145	88	15	1.2	0.7	
	24	J116	160326_185247	18:52	18:54		0	145	87	14	1.3	0.8	
	25	J117	160326_185954	18:59	19:01		180	146	87	15	1.2	0.7	
	26	J118	160326_190524	19:05	19:06		0	145	86	15	1.3	0.7	

ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	SN 8235						**Sensor Operator/s**	
									-		Bertin Evina-Ze	
Date/Julian:	3/26/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**	**Pilot/s**	
Hobbs End	3115.0			3-808654C			150			TEMP	MWAZ	
Hobbs ST	3110.9		LIFT	**705**			**TAR ALT AGL (ft):**	**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	4.1		**B**				6,400	AR_ALS80_NCRS		1.500	421C 13RF	KSGT(Stuttgart, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
B									84				
	1	D02	160326_222917	22:29	22:44	6,200	180	152	77	18	1.1	0.6	
	2	D03	160326_224859	22:48	23:04		0	153	71	18	1.3	0.6	
	3	D04	160326_230939	23:09	23:25		180	150	65	17	1.2	0.6	
	4	D05	160326_232905	23:29	23:43		0	151	59	17	1.1	0.7	
	5	D06	160326_234841	23:48	24:02		180	149	53	15	1.2	0.8	
	6	D07	160327_000701	24:07	24:20		0	151	47	16	1.1	0.7	
	7	D08	160327_002506	24:25	24:38		180	151	42	16	1.3	0.7	
	8	D09	160327_004204	24:42	24:54		0	151	36	16	1.3	0.8	
	9	D10	160327_005957	24:59	1:12		180	151	31	15	1.3	0.8	
	10	X14	160327_011758	1:17	1:20		90	150	30	16	1.2	0.7	**X-STRIP**
	11	D01	160327_012334	1:23	1:25		0	148	30	17	1.2	0.6	
	12	X13	160327_012841	1:28	1:31		270	150	28	18	1.1	0.6	**X-STRIP**

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ALS80 LiDAR Flight Log

Project	**Arkansas-NCRS-QL2**			**ALS80_HP**	SN 8235						**Sensor Operator/s**	
									-		Bertin Evina-Ze	
Date/Julian:	3/26/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**	**Pilot/s**	
Hobbs End	3115.0			3-808654C			150			TEMP	MWAZ	
Hobbs ST	3110.9		LIFT	**705**			**TAR ALT AGL (ft):**	**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	4.1		**B**				6,400	AR_ALS80_NCRS		1.500	421C 13RF	KSGT(Stuttgart, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude:**	**Direction**	**Speed:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**	**ASL:**		**kts:**	**MM Space**		**PDOP**	**HDOP**	
B									242				
	1	D02	160326_222917	22:29	22:44	6,200	180	149	238	17	1.1	0.6	
	2	D03	160326_224859	22:48	23:04		0	151	233	17	1.2	0.7	
	3	D04	160326_230939	23:09	23:25		180	151	229	16	1.2	0.7	
	4	D05	160326_232905	23:29	23:43		0	150	225	17	1.1	0.6	
	5	D06	160326_234841	23:48	24:02		180	152	220	18	1.2	0.6	
	6	D07	160327_000701	24:07	24:20		0	152	216	17	1.3	0.7	
	7	D08	160327_002506	24:25	24:38		180	150	211	18	1.1	0.6	
	8	D09	160327_004204	24:42	24:54		0	149	208	16	1.7	0.7	
	9	D10	160327_005957	24:59	1:12		180	150	205	18	1.3	0.6	
	10	X14	160327_011758	1:17	1:20		0	150	202	18	1.3	0.6	
	11	D01	160327_012334	1:23	1:25		180	152	199	18	1.3	0.6	**X-STRIP**
	12	X13	160327_012841	1:28	1:31		0	149	196	17	1.3	0.7	**X-STRIP**

ALS80 LiDAR Flight Log

Project	**RedRiverAR**			**ALS80_HP**	**SN 8235**							**Sensor Operator/s**	
										-		Bertin Evina-Ze	
Date/Julian:	3/28/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**				**Base PID:**	**Pilot/s**	
Hobbs End	3120.8			3-808654C			155				TEMP	Mike Millard	
Hobbs ST	3116.0		LIFT	**705**			**TAR ALT AGL (ft):**		**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	4.8		**A**				6,250		RedRiverAR		1.500	421C 13RF	KM18(Hope, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude: ASL:**	**Direction**	**Speed: kts:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**				**MM Space**		**PDOP**	**HDOP**	
A									432				
	1	20160328_190939	X03	19:42	19:47	6,200	90	155	430	19	1.1	0.6	**X-STRIP**
	2	20160328_190939	R59	19:52	19:55		180	157	429	18	1.1	0.6	
	3	20160328_190939	R58	20:00	20:05		0	156	427	17	1.2	0.6	
	4	20160328_190939	R57	20:10	20:15		180	156	424	16	1.4	0.6	
	5	20160328_190939	R56	20:19	20:24		0	155	422	16	1.4	0.6	
	6	20160328_190939	R55	20:29	20:36		180	153	419	16	1.4	0.6	
	7	20160328_190939	R54	20:40	20:46		0	157	416	18	1.1	0.6	
	8	20160328_190939	R53	20:51	21:03		180	156	411	19	1.1	0.6	
	9	20160328_190939	R52	21:07	21:19		0	156	405	17	1.2	0.6	
	10	20160328_190939	R51	21:23	21:35		180	157	400	17	1.2	0.6	
	11	20160328_190939	R50	21:39	21:52		0	154	395	18	1.2	0.6	
	12	20160328_190939	R49	21:56	22:08		180	154	390	17	1.2	0.6	
	13	20160328_190939	R48	22:13	22:25		0	153	385	19	1.1	0.6	
	14	20160328_190939	R47	22:30	22:43		180	155	379	17	1.4	0.6	
	15	20160328_190939	R46	22:48	23:01		0	155	374	18	1.2	0.6	
	16	20160328_190939	R45	23:05	23:18		180	156	369	19	1.1	0.6	
	17	20160328_190939	X04	23:25	23:29		81	154	367	17	1.1	0.6	**X-STRIP**
	18	20160328_190939	R44	23:40	23:54		0	153	362	15	1.3	0.7	

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ALS80 LiDAR Flight Log

Project	**RedRiverAR**			**ALS80_HP**	**SN 8235**							**Sensor Operator/s**	
										-		Bertin Evina-Ze	
Date/Julian:	3/31/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**				**Base PID:**	**Pilot/s**	
Hobbs End	3126.5			3-808654C			155				TEMP	MWAZ	
Hobbs ST	3121.6		LIFT	**705**			**TAR ALT AGL (ft):**		**Flight Plan(s):**		**Base Height:**	**Aircraft**	**Airport Idnt:**
Flight Time	4.9		**A**				6,250		RedRiverAR		1.500	421C 13RF	KM18(Hope, AR)

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude: ASL:**	**Direction**	**Speed: kts:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**				**MM Space**		**PDOP**	**HDOP**	
A									358				
	1	20160331_225021	R22	23:21	23:25	6,200	270	155	256	16	1.2	0.7	
	2	20160331_225021	R23	23:30	23:35		90	154	354	14	1.5	0.8	
	3	20160331_225021	R24	23:40	23:45		270	155	352	15	1.4	0.8	
	4	20160331_225021	R25	23:50	23:54		90	157	350	15	1.3	0.8	
	5	20160331_225021	R26	23:59	24:03		270	153	348	14	1.5	0.8	
	6	20160331_225021	R27	24:08	20:13		90	155	345	14	1.4	0.8	
	7	20160331_225021	R28	24:19	24:22		270	153	344	14	1.4	0.8	
	8	20160331_225021	R29	24:26	24:28		90	152	344	14	1.4	0.8	
	9	20160331_225021	R30	24:34	24:36		270	155	343	14	1.3	0.8	
	10	20160331_225021	R31	24:41	24:43		90	154	342	14	1.3	0.8	
	11	20160331_225021	R32	24:48	24:50		270	150	341	14	1.3	0.8	
	12	20160331_225021	R33	24:54	24:55		90	151	341	14	1.3	0.8	
	13	20160331_225021	X02	24:59	1:03		0	154	339	15	1.2	0.8	**X-STRIP**
	14	20160331_225021	R39	1:07	1:20		180	156	334	16	1.2	0.7	
	15	20160331_225021	R40	1:25	1:39		0	157	328	15	1.3	0.8	
	16	20160331_225021	R41	1:43	1:57		180	156	323	18	1.0	0.6	
	17	20160331_225021	R42	2:02	2:17		0	155	317	16	1.2	0.7	
	18	20160331_225021	R43	2:21	2:35		180	154	311	16	1.2	0.7	
	19	20160331_225021	R38	2:38	2:44		0	153	309	17	1.2	0.7	
	20	20160331_225021	R37	2:48	2:53		180	154	306	16	1.3	0.7	
	21	20160331_225021	R36	2:58	3:02		0	154	305	17	1.1	0.6	
	22	20160331_225021	R35	3:07	3:10		180	155	303	17	1.1	0.6	
	23	20160331_225021	R34	3:15	3:17		0	156	302	16	1.2	0.7	
	24	20160331_225021	X04	3:22	3:25		81	154	301	17	1.1	0.6	**X-STRIP**
	25	20160331_225021	X03	3:32	3:33		270	155	300	18	1.1	0.6	**X-STRIP**

ALS80 LiDAR Flight Log

Project	**RedRiverAR**			**ALS80_HP**	**SN 8235**							**Sensor Operator/s**	
										-		Bertin Evina-Ze	
Date/Julian:	4/2/2016			**Disk Drive MM70**			**TAR AIRSPD (KNTS)**			**Base PID:**		**Pilot/s**	
Hobbs End	3131.3			3-808654C			155			TEMP		Mike Millard	
Hobbs ST	3126.5		LIFT	**705**			**TAR ALT AGL (ft):**		**Flight Plan(s):**	**Base Height:**	**Aircraft**	**Airport Idnt:**	
Flight Time	4.8		**A**				6,250		RedRiverAR	1.500	421C 13RF	KM18(Hope, AR)	

Lift		**Flight Line**	**Mission Line**	**UTC time:**		**GPS Altitude: ASL:**	**Direction**	**Speed: kts:**	Available	**S/Vs:**	**Position Acc.**		**Comments and Conditions:**
				B:	**E:**				**MM Space**		**PDOP**	**HDOP**	
A									300				
	1	20160402_132846	X02	13:57	14:01	6,200	180	148	299	21	1.0	0.6	**X-STRIP**
	2	20160402_132846	R21	14:09	14:20		270	152	294	20	1.1	0.6	
	3	20160402_132846	R20	14:24	14:36		90	154	289	18	1.3	0.7	
	4	20160402_132846	R19	14:41	14:54		270	156	284	18	1.2	0.7	
	5	20160402_132846	R18	14:57	15:10		90	153	279	18	1.1	0.7	
	6	20160402_132846	R17	15:14	15:27		270	152	274	18	1.1	0.7	
	7	20160402_132846	R16	15:30	15:44		90	154	268	17	1.2	0.7	
	8	20160402_132846	R15	15:48	16:01		270	155	263	15	1.4	0.8	
	9	20160402_132846	R14	16:05	16:19		90	154	257	16	1.3	0.7	
	10	20160402_132846	R13	16:23	16:37		270	153	252	17	1.2	0.7	
	11	20160402_132846	R12	16:41	16:54		90	155	246	16	1.2	0.7	
	12	20160402_132846	R11	16:59	17:12		270	155	240	14	1.3	0.8	
	13	20160402_132846	R10	17:17	17:30		90	154	234	14	1.4	0.8	
	14	20160402_132846	R09	17:35	17:48		270	155	229	14	1.3	0.8	
	15	20160402_132846	X01	17:53	17:56		166	155	228	14	1.3	0.8	**X-STRIP**
	16	20160402_132846	R08	18:05	18:09	6,300	90	154	226	15	1.2	0.8	

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ALS80 LiDAR Flight Log														
Project	RedRiverAR			ALS80_HP	SN 8235								Sensor Operator/s	
										-			Bertin Evina-Ze	
Date/Julian:	4/2/2016			Disk Drive MM70			TAR AIRSPD (KNTS)				Base PID:		Pilot/s	
Hobbs End	3133.0			3-808654C			155				TEMP		MWAZ	
Hobbs ST	3131.3		LIFT	705			TAR ALT AGL (ft):		Flight Plan(s):		Base Height:		Aircraft	Airport Idnt:
Flight Time	1.7		B				6,250		RedRiverAR		1.500		421C 13RF	KM18(Hope, AR)

Lift		Flight Line	Mission Line	UTC time: B:	UTC time: E:	GPS Altitude: ASL:	Direction	Speed: kts:	Available MM Space	S/Vs:	Position Acc. PDOP	Position Acc. HDOP	Comments and Conditions:
B									225				
	1	20160402_190731	R07	19:36	19:39	6,200	270	156	224	16	1.2	0.6	
	2	20160402_190731	R06	19:44	19:46		90	153	223	16	1.2	0.6	
	3	20160402_190731	R05	19:50	19:52		270	156	222	15	1.4	0.7	
	4	20160402_190731	R04	19:56	19:58		90	154	222	15	1.4	0.7	
	5	20160402_190731	R03	20:02	20:04		270	151	221	15	1.4	0.7	
	6	20160402_190731	R02	20:08	20:10		90	154	220	15	1.4	0.7	
	7	20160402_190731	R01	20:15	20:16		270	155	219	17	1.1	0.6	
	8	20160402_190731	X01	20:21	20:23		166	154	218	17	1.1	0.6	X-STRIP
	9	20160402_190731	X01	20:28	20:31		346	150	217	17	1.1	0.6	X-STRIP

Appendix B. Vertical Accuracy Calculations

Project Information

Prepared By: Kenneth L. Coffey
Project Name: NRCS Arkansas QL2 LiDAR
Sensor Info: Leica ALS80 SN#8235
Required Nominal Pulse Spacing: 0.7
Vendor Name: Digital Aerial Solutions, LLC
Units: Meters
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 2/17/2016 Finish: 4/2/2016

Metadata Information

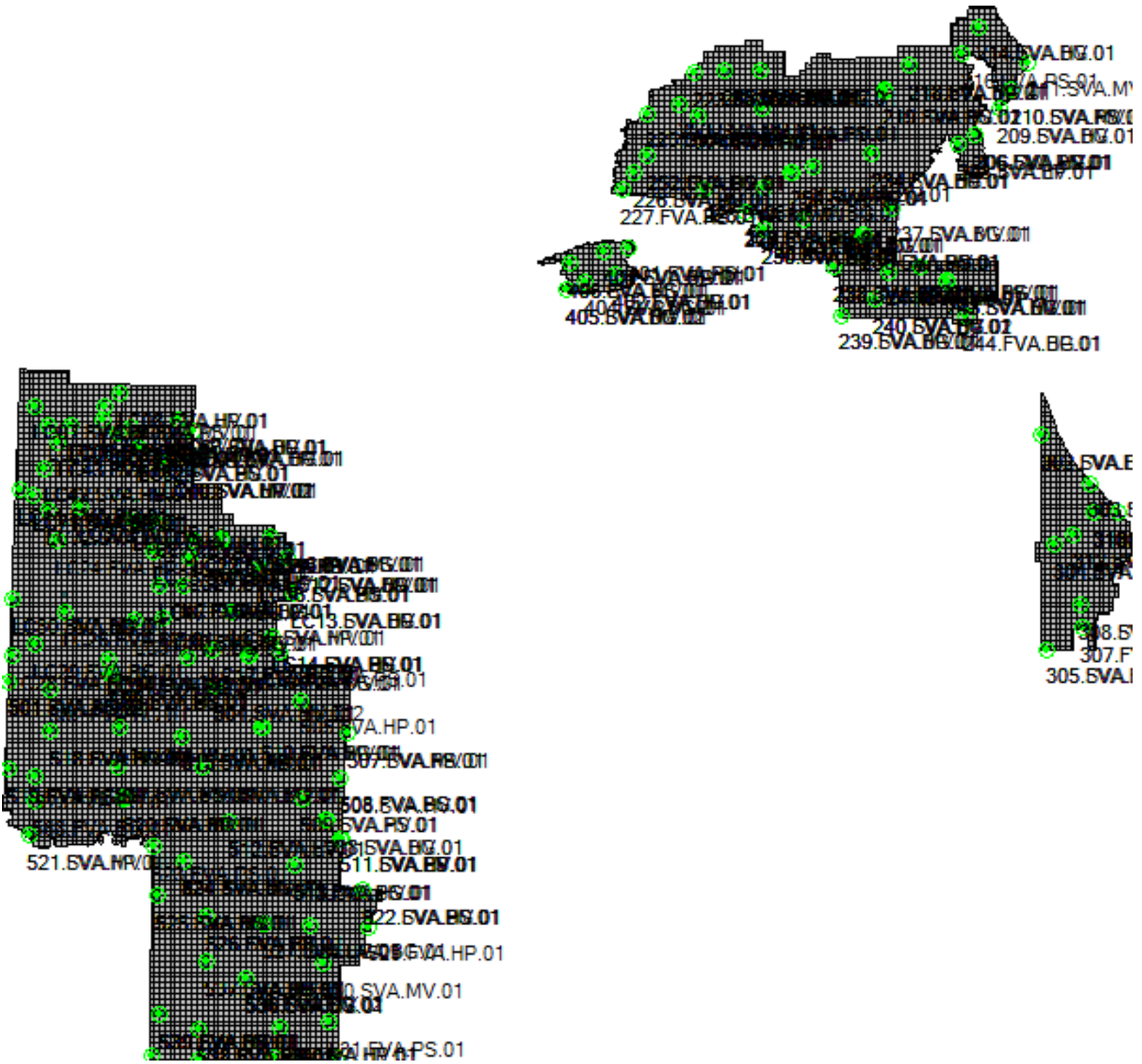
Tile Index:
- Filename: Clipped_Arkansas_Index_Final_USNG_utm15_1500M.shp
- Number of Polys: 0

Intensity:
- Tile Index Attribute: Not Specified
- Data Filename: Not Specified

DEM:
- Tile Index Attribute: NAME
- Data Filename: DEM

LAS:
- Tile Index Attribute: NAME
- Data Filename: LAS_Final

Tiled-Data Area



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
Bare Ground	98	0.168		
Hard Pavement	54	0.163		
High Vegetation	73		0.144	
Low Vegetation	25		0.240	
Medium Vegetation	53		0.159	
Packed Sand	55	0.115		
Total	358			
DEM				
Bare Ground	98	0.171		
Hard Pavement	54	0.166		
High Vegetation	73		0.152	
Low Vegetation	25		0.246	
Medium Vegetation	53		0.160	
Packed Sand	55	0.111		
Total	358			

Units: Meters

Coordinates and Offsets of Analyzed Locations

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
1)	☑	**206.FVA.BG.01**					
			630402.097	3908663.637	75.39	75.279	75.279
					Bare Ground	-0.111	-0.111
2)	☑	**209.FVA.BG.01**					
			636916.289	3915824.657	69.795	69.743	69.747
					Bare Ground	-0.052	-0.048
3)	☑	**214.FVA.BG.01**					
			631403.725	3938573.203	172.802	172.74	172.733
					Bare Ground	-0.062	-0.069
4)	☑	**218.FVA.BG.01**					
			612216.253	3927982	202.115	202.123	202.124
					Bare Ground	0.008	0.009
5)	☑	**219.FVA.BG.01**					
			605235.792	3920985.215	102.045	102.112	102.12
					Bare Ground	0.067	0.075
6)	☑	**223.FVA.BG.01**					
			552826.555	3925737.293	344.483	344.533	344.529
					Bare Ground	0.05	0.046
7)	☑	**224.FVA.BG.01**					
			553705.094	3913778.211	208.408	208.411	208.4
					Bare Ground	0.003	-0.008

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
8)	**226.FVA.BG.01**					
		536432.519	3898229.336	104.052	104.088	104.089
				Bare Ground	0.036	0.037
9)	**228.FVA.BG.01**					
		555524.444	3893825.411	104.817	104.966	104.973
				Bare Ground	0.149	0.156
10)	**229.FVA.BG.01**					
		566958.061	3887422.896	138.333	138.402	138.377
				Bare Ground	0.069	0.044
11)	**231.FVA.BG.01**					
		583109.126	3885528.941	85.931	85.981	85.989
				Bare Ground	0.05	0.058
12)	**232.FVA.BG.01**					
		585655.555	3899700.642	188.089	188.225	188.21
				Bare Ground	0.136	0.121
13)	**234.FVA.BG.01**					
		601882.099	3903480.88	111.821	111.748	111.823
				Bare Ground	-0.073	0.002
14)	**236.FVA.BG.01**					
		599445.526	3881097.153	72.895	72.932	72.936
				Bare Ground	0.037	0.041

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
15)	**237.FVA.BG.01**					
		607463.411	3888598.964	73.275	73.316	73.284
				Bare Ground	0.041	0.009
16)	**238.FVA.BG.01**					
		591541.896	3872254.842	78.346	78.374	78.377
				Bare Ground	0.028	0.031
17)	**239.FVA.BG.01**					
		593337.348	3858836.032	81.043	81.05	81.06
				Bare Ground	0.007	0.017
18)	**240.FVA.BG.01**					
		602799.189	3863386.425	81.666	81.721	81.724
				Bare Ground	0.055	0.058
19)	**240.FVA.BG.02**					
		602783.679	3863417.555	81.132	81.171	81.162
				Bare Ground	0.039	0.03
20)	**241.FVA.BG.01**					
		606293.793	3870969.925	70.171	70.205	70.205
				Bare Ground	0.034	0.034
21)	**242.FVA.BG.01**					
		615187.335	3872491.609	75.165	75.153	75.179
				Bare Ground	-0.012	0.014

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
22)	**243.FVA.BG.01**					
		622762.914	3868451.958	64.857	64.97	64.966
				Bare Ground	0.113	0.109
23)	**244.FVA.BG.01**					
		627682.493	3858663.055	57.832	57.889	57.89
				Bare Ground	0.057	0.058
24)	**250.FVA.BG.01**					
		579652.555	3898510.417	132.32	132.334	132.335
				Bare Ground	0.014	0.015
25)	**251.FVA.BG.01**					
		572334.023	3894316.418	95.263	95.274	95.29
				Bare Ground	0.011	0.027
26)	**252.FVA.BG.01**					
		540047.796	3902825.008	121.43	121.445	121.433
				Bare Ground	0.015	0.003
27)	**253.FVA.BG.01**					
		548779.261	3917278.258	195.034	195.03	195.004
				Bare Ground	-0.004	-0.03
28)	**255.FVA.BG.01**					
		561055.676	3926251.608	211.929	212.199	212.2
				Bare Ground	0.27	0.271

Coordinates and Offsets of Analyzed Locations (Continued)

	ID			Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
29)	**256.FVA.BG.01**					
		570906.864	3926216.545	285.368	285.505	285.478
				Bare Ground	0.137	0.11
30)	**302.FVA.BG.01**					
		648801.85	3825851.649	64.694	64.691	64.708
				Bare Ground	-0.003	0.014
31)	**303.FVA.BG.01**					
		662058.906	3812774.292	61.816	61.892	61.901
				Bare Ground	0.076	0.085
32)	**304.FVA.BG.01**					
		652479.548	3795834.341	57.822	57.812	57.81
				Bare Ground	-0.01	-0.012
33)	**305.FVA.BG.01**					
		650166.182	3766841.403	54.196	54.272	54.254
				Bare Ground	0.076	0.058
34)	**307.FVA.BG.01**					
		659995.044	3772935.627	55.135	55.229	55.204
				Bare Ground	0.094	0.069
35)	**307.FVA.BG.02**					
		659988.136	3772917.164	55.196	55.276	55.263
				Bare Ground	0.08	0.067

Coordinates and Offsets of Analyzed Locations (Continued)

	ID			Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
36)	**308.FVA.BG.01**					
		659348.324	3779207.832	55.535	55.639	55.668
				Bare Ground	0.104	0.133
37)	**309.FVA.BG.01**					
		669753.645	3804639.947	56.484	56.473	56.472
				Bare Ground	-0.011	-0.012
38)	**310.FVA.BG.01**					
		663252.864	3804634.961	58.079	58.154	58.143
				Bare Ground	0.075	0.064
39)	**312.FVA.BG.01**					
		657641.947	3798488.678	49.947	50.049	50.05
				Bare Ground	0.102	0.103
40)	**402.FVA.BG.01**					
		530785.471	3870016.591	101.818	101.828	101.817
				Bare Ground	0.01	-0.001
41)	**404.FVA.BG.01**					
		522732.577	3868364.45	94.055	94.033	94.039
				Bare Ground	-0.022	-0.016
42)	**405.FVA.BG.01**					
		517682.967	3865905.995	224.684	224.655	224.641
				Bare Ground	-0.029	-0.043

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
43)	**405.FVA.BG.02**					
		517682.036	3865963.202	222.904	222.864	222.869
				Bare Ground	-0.04	-0.035
44)	**406.FVA.BG.01**					
		518305.888	3873268.433	86.007	85.995	86
				Bare Ground	-0.012	-0.007
45)	**407.FVA.BG.01**					
		527932.777	3876732.521	94.677	94.715	94.715
				Bare Ground	0.038	0.038
46)	**501.FVA.BG.01**					
		363562.557	3758038.614	101.308	101.35	101.353
				Bare Ground	0.042	0.045
47)	**502.FVA.BG.01**					
		374983.055	3755957.006	112.734	112.887	112.878
				Bare Ground	0.153	0.144
48)	**503.FVA.BG.01**					
		391917.403	3759740.165	128.251	128.362	128.354
				Bare Ground	0.111	0.103
49)	**508.FVA.BG.01**					
		455161.838	3731379.579	86.449	86.463	86.464
				Bare Ground	0.014	0.015

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
50)	**510.FVA.BG.01**					
		433486.809	3745585.841	117.289	117.276	117.261
				Bare Ground	-0.013	-0.028
51)	**513.FVA.BG.01**					
		442579.492	3707369.569	105.593	105.605	105.605
				Bare Ground	0.012	0.012
52)	**514.FVA.BG.01**					
		416892.829	3734334.466	121.765	121.77	121.761
				Bare Ground	0.005	-0.004
53)	**516.FVA.BG.01**					
		394108.045	3745376.202	95.485	95.553	95.534
				Bare Ground	0.068	0.049
54)	**518.FVA.BG.01**					
		375016.674	3744242.588	102.239	102.275	102.277
				Bare Ground	0.036	0.038
55)	**519.FVA.BG.01**					
		363353.896	3733869.872	117.293	117.242	117.241
				Bare Ground	-0.051	-0.052
56)	**520.FVA.BG.01**					
		395473.467	3725912.275	100.584	100.518	100.519
				Bare Ground	-0.066	-0.065

Coordinates and Offsets of Analyzed Locations (Continued)

	ID			Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
57)	**522.FVA.BG.01**					
		461488.442	3700540.106	109.154	109.14	109.127
				Bare Ground	-0.014	-0.027
58)	**524.FVA.BG.01**					
		411829.113	3708491.133	80.29	80.283	80.277
				Bare Ground	-0.007	-0.013
59)	**525.FVA.BG.01**					
		404373.009	3698988.09	87.889	87.946	87.943
				Bare Ground	0.057	0.053
60)	**527.FVA.BG.01**					
		433958.424	3691186.607	71.235	71.216	71.223
				Bare Ground	-0.019	-0.012
61)	**528.FVA.BG.01**					
		446556.828	3690836.062	81.138	81.109	81.111
				Bare Ground	-0.029	-0.027
62)	**532.FVA.BG.01**					
		453901.741	3654254.779	73.491	73.518	73.52
				Bare Ground	0.027	0.029
63)	**536.FVA.BG.01**					
		429088.034	3676219.591	64.46	64.487	64.468
				Bare Ground	0.027	0.008

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
64)	**536.FVA.BG.02**					
		429052.106	3676226.904	64.836	64.863	64.863
				Bare Ground	0.027	0.027
65)	**537.FVA.BG.01**					
		418100.32	3680725.759	93.968	93.965	93.962
				Bare Ground	-0.003	-0.006
66)	**538.FVA.BG.01**					
		415957.899	3661958.453	68.352	68.42	68.439
				Bare Ground	0.068	0.087
67)	**539.FVA.BG.01**					
		405334.648	3666294.07	106.906	106.944	106.936
				Bare Ground	0.038	0.03
68)	**541.FVA.BG.01**					
		415907.493	3653908.556	75.491	75.527	75.538
				Bare Ground	0.036	0.047
69)	**568.FVA.BG.01**					
		370767.079	3725089.159	95.053	94.897	94.892
				Bare Ground	-0.156	-0.161
70)	**588.FVA.BG.01**					
		451180.79	3719891.396	113.024	112.97	112.972
				Bare Ground	-0.054	-0.052

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
71)	**LC04.FVA.BG.01**					
		414554.445	3827036.17	272.916	272.868	272.87
				Bare Ground	-0.048	-0.046
72)	**LC05.FVA.BG.01**					
		397131.588	3828031.308	314.674	314.607	314.575
				Bare Ground	-0.067	-0.099
73)	**LC06.FVA.BG.01**					
		380676.383	3828476.671	332.534	332.511	332.513
				Bare Ground	-0.023	-0.022
74)	**LC07.FVA.BG.01**					
		370589.408	3833967.081	302.911	303.009	302.986
				Bare Ground	0.098	0.075
75)	**LC12.FVA.BG.01**					
		440382.402	3792131.695	199.218	199.209	199.233
				Bare Ground	-0.009	0.014
76)	**LC13.FVA.BG.01**					
		441860.391	3782093.835	202.771	202.826	202.78
				Bare Ground	0.055	0.009
77)	**LC14.FVA.BG.01**					
		436508.368	3770154.674	109.533	109.567	109.571
				Bare Ground	0.034	0.038

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
78)	**LC16.FVA.BG.01**					
		429856.66	3764962.504	171.451	171.486	171.479
				Bare Ground	0.035	0.028
79)	**LC17.FVA.BG.01**					
		419622.963	3766890.237	204.353	204.3	204.398
				Bare Ground	-0.053	0.044
80)	**LC19.FVA.BG.01**					
		411851.219	3784505.467	233.829	233.6	233.615
				Bare Ground	-0.229	-0.214
81)	**LC22.FVA.BG.01**					
		414535.487	3797115.499	285.679	285.697	285.7
				Bare Ground	0.018	0.021
82)	**LC23.FVA.BG.01**					
		403806.415	3794027.627	271.145	271.278	271.244
				Bare Ground	0.133	0.099
83)	**LC26.FVA.BG.01**					
		379018.268	3777080.767	185.258	185.129	185.14
				Bare Ground	-0.129	-0.118
84)	**LC29.FVA.BG.01**					
		370731.241	3768051.734	107.11	107.203	107.195
				Bare Ground	0.093	0.085

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
85)	**LC30.FVA.BG.01**					
		364680.265	3780710.371	232.638	232.939	232.913
				Bare Ground	0.301	0.275
86)	**LC31.FVA.BG.01**					
		398480.902	3774827.104	151.081	151.107	151.103
				Bare Ground	0.026	0.022
87)	**LC32.FVA.BG.01**					
		406232.806	3775684.882	129.334	129.623	129.675
				Bare Ground	0.289	0.341
88)	**LC34.FVA.BG.01**					
		391134.308	3764114.522	113.161	113.212	113.227
				Bare Ground	0.051	0.066
89)	**LC36.FVA.BG.01**					
		432906.751	3789273.233	192.152	192.153	192.145
				Bare Ground	0.001	-0.007
90)	**LC41.FVA.BG.01**					
		366611.372	3810851.683	318.374	318.397	318.4
				Bare Ground	0.023	0.026
91)	**LC43.FVA.BG.01**					
		377296.837	3823826.786	287.471	287.437	287.463
				Bare Ground	-0.034	-0.008

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
92)	**LC46.FVA.BG.01**					
		435985.909	3797832.659	266.863	266.851	266.868
				Bare Ground	-0.012	0.005
93)	**LC47.FVA.BG.01**					
		405265.304	3784419.501	188.833	189.124	189.13
				Bare Ground	0.291	0.297
94)	**LC60.FVA.BG.01**					
		393483.208	3826459.585	310.793	310.768	310.781
				Bare Ground	-0.025	-0.012
95)	**LC62.FVA.BG.01**					
		399516.033	3822439.511	291.943	291.971	291.95
				Bare Ground	0.028	0.007
96)	**LC63.FVA.BG.01**					
		410289.033	3829997.295	308.482	308.499	308.45
				Bare Ground	0.017	-0.032
97)	**LC71.FVA.BG.01**					
		370391.896	3809185.22	313.868	313.799	313.822
				Bare Ground	-0.069	-0.046
98)	**LC72.FVA.BG.01**					
		374362.417	3805202.409	329.83	329.781	329.783
				Bare Ground	-0.049	-0.048

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
99)	☑	**208.FVA.HP.01**					
			625721.298	3905933.807	73.514	73.428	73.445
					Hard Pavement	-0.086	-0.069
100)	☑	**218.FVA.HP.01**					
			612237.004	3927945.531	201.519	201.531	201.537
					Hard Pavement	0.012	0.018
101)	☑	**227.FVA.HP.01**					
			532942.441	3893436.563	116.165	116.216	116.218
					Hard Pavement	0.051	0.053
102)	☑	**230.FVA.HP.01**					
			572004.851	3882672.704	94.911	94.946	94.943
					Hard Pavement	0.035	0.032
103)	☑	**234.FVA.HP.01**					
			601878.784	3903462.918	111.087	111.065	111.059
					Hard Pavement	-0.022	-0.028
104)	☑	**238.FVA.HP.01**					
			591542.245	3872214.506	78.547	78.598	78.596
					Hard Pavement	0.051	0.049
105)	☑	**239.FVA.HP.01**					
			593311.749	3858862.502	81.915	81.926	81.898
					Hard Pavement	0.011	-0.017

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
106)	☑	**241.FVA.HP.01**					
			606355.869	3870986.636	68.912	68.95	68.947
					Hard Pavement	0.038	0.035
107)	☑	**244.FVA.HP.01**					
			627659.839	3858673.605	58.572	58.616	58.626
					Hard Pavement	0.044	0.054
108)	☑	**255.FVA.HP.01**					
			561039.516	3926249.378	212.184	212.454	212.453
					Hard Pavement	0.27	0.269
109)	☑	**302.FVA.HP.01**					
			648816.61	3825908.23	64.25	64.228	64.228
					Hard Pavement	-0.022	-0.022
110)	☑	**402.FVA.HP.01**					
			530811.896	3870027.035	101.811	101.803	101.787
					Hard Pavement	-0.008	-0.024
111)	☑	**407.FVA.HP.01**					
			527956.076	3876711.822	94.961	94.906	94.925
					Hard Pavement	-0.055	-0.036
112)	☑	**505.FVA.HP.01**					
			444267.886	3752933.359	121.975	121.889	121.905
					Hard Pavement	-0.086	-0.07

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
113)	☑	**507.FVA.HP.01**					
			457213.055	3743628.706	120.247	120.299	120.295
					Hard Pavement	0.052	0.048
114)	☑	**510.FVA.HP.01**					
			433461.675	3745564.636	117.536	117.608	117.605
					Hard Pavement	0.072	0.069
115)	☑	**511.FVA.HP.01**					
			455311.417	3714903.964	99.31	99.246	99.248
					Hard Pavement	-0.064	-0.062
116)	☑	**512.FVA.HP.01**					
			424621.5	3719356.739	78.662	78.572	78.574
					Hard Pavement	-0.09	-0.088
117)	☑	**515.FVA.HP.01**					
			411477.273	3742969.979	93.48	93.556	93.547
					Hard Pavement	0.076	0.067
118)	☑	**518.FVA.HP.01**					
			374980.908	3744246.053	102.555	102.545	102.543
					Hard Pavement	-0.01	-0.012
119)	☑	**520.FVA.HP.01**					
			395466.076	3725960.334	100.926	100.861	100.864
					Hard Pavement	-0.065	-0.062

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
120)	**521.FVA.HP.01**					
		369173.366	3715509.913	93.81	93.756	93.756
				Hard Pavement	-0.054	-0.054
121)	**526.FVA.HP.01**					
		418306.325	3693306.959	111.711	111.679	111.686
				Hard Pavement	-0.032	-0.025
122)	**529.FVA.HP.01**					
		462964.934	3690478.644	86.862	86.921	86.93
				Hard Pavement	0.059	0.068
123)	**532.FVA.HP.01**					
		453901.591	3654280.389	73.318	73.367	73.373
				Hard Pavement	0.049	0.055
124)	**533.FVA.HP.01**					
		436907.673	3654254.368	75.547	75.522	75.508
				Hard Pavement	-0.025	-0.039
125)	**534.FVA.HP.01**					
		438485.474	3662502.486	78.427	78.432	78.438
				Hard Pavement	0.005	0.011
126)	**537.FVA.HP.01**					
		418012.158	3680732.793	94.669	94.73	94.746
				Hard Pavement	0.061	0.077

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
127) ☑	**LC04.FVA.HP.01**					
		414496.715	3826863.166	275.062	275.088	275.14
				Hard Pavement	0.026	0.078
128) ☑	**LC05.FVA.HP.01**					
		397149.493	3828028.259	314.825	314.769	314.79
				Hard Pavement	-0.056	-0.035
129) ☑	**LC06.FVA.HP.01**					
		380664.084	3828506.719	333.209	333.17	333.167
				Hard Pavement	-0.039	-0.042
130) ☑	**LC07.FVA.HP.01**					
		370624.831	3833949.907	302.778	302.781	302.78
				Hard Pavement	0.003	0.002
131) ☑	**LC08.FVA.HP.01**					
		394069.277	3837324.125	389.56	389.476	389.507
				Hard Pavement	-0.084	-0.053
132) ☑	**LC11.FVA.HP.01**					
		422491.029	3797142.209	239.375	239.375	239.357
				Hard Pavement	0	-0.018
133) ☑	**LC12.FVA.HP.01**					
		440371.403	3792087.315	197.03	197.062	197.057
				Hard Pavement	0.032	0.027

Coordinates and Offsets of Analyzed Locations (Continued)

	ID			Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
134)	**LC13.FVA.HP.01**					
		441887.4	3782084.591	203.822	203.734	203.731
				Hard Pavement	-0.088	-0.091
135)	**LC14.FVA.HP.01**					
		436516.354	3770130.477	109.265	109.262	109.27
				Hard Pavement	-0.003	0.005
136)	**LC17.FVA.HP.01**					
		419689.974	3766869.888	205.769	205.786	205.793
				Hard Pavement	0.017	0.024
137)	**LC19.FVA.HP.01**					
		411837.575	3784497.625	233.482	233.787	233.785
				Hard Pavement	0.305	0.303
138)	**LC21.FVA.HP.01**					
		413609.003	3792261.406	266.892	266.858	266.864
				Hard Pavement	-0.034	-0.028
139)	**LC22.FVA.HP.01**					
		414543.034	3797111.468	286.06	286.055	286.052
				Hard Pavement	-0.005	-0.008
140)	**LC24.FVA.HP.01**					
		376856.937	3796654.114	312.512	312.823	312.808
				Hard Pavement	0.311	0.296

Coordinates and Offsets of Analyzed Locations (Continued)

	ID			Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
141)	**LC28.FVA.HP.01**					
		364365.815	3764998.622	104.529	104.559	104.557
				Hard Pavement	0.03	0.028
142)	**LC35.FVA.HP.01**					
		424937.933	3777222.555	165.534	165.563	165.577
				Hard Pavement	0.029	0.043
143)	**LC37.FVA.HP.01**					
		383122.323	3806112.632	331.348	331.27	331.266
				Hard Pavement	-0.078	-0.082
144)	**LC38.FVA.HP.01**					
		397946.598	3803154.362	335.021	334.922	334.917
				Hard Pavement	-0.099	-0.104
145)	**LC40.FVA.HP.01**					
		406319.579	3818115.559	328.308	328.244	328.25
				Hard Pavement	-0.064	-0.058
146)	**LC40.FVA.HP.02**					
		406296.526	3818115.362	328.454	328.398	328.403
				Hard Pavement	-0.056	-0.051
147)	**LC42.FVA.HP.01**					
		373439.536	3816814.274	299.69	299.695	299.703
				Hard Pavement	0.005	0.013

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
148) ☑	**LC43.FVA.HP.01**					
		377285.69	3823849.897	287.091	287.076	287.093
				Hard Pavement	-0.015	0.002
149) ☑	**LC63.FVA.HP.01**					
		410282.18	3830018.158	308.601	308.604	308.583
				Hard Pavement	0.003	-0.018
150) ☑	**LC65.FVA.HP.01**					
		389489.889	3830348.372	340.752	340.824	340.768
				Hard Pavement	0.072	0.016
151) ☑	**LC70.FVA.HP.01**					
		374456.633	3828579.291	292.288	292.292	292.28
				Hard Pavement	0.004	-0.008
152) ☑	**LC71.FVA.HP.01**					
		370445.66	3809195.499	314.983	314.96	314.963
				Hard Pavement	-0.023	-0.02
153) ☑	**206.FVA.PS.01**					
		630358.994	3908610.033	74.701	74.625	74.633
				Packed Sand	-0.076	-0.068
154) ☑	**210.FVA.PS.01**					
		640273.557	3921168.671	76.01	75.86	75.852
				Packed Sand	-0.15	-0.158

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
155)	**216.FVA.PS.01**					
		626857.622	3931069.617	180.749	180.723	180.734
				Packed Sand	-0.026	-0.015
156)	**219.FVA.PS.01**					
		605227.491	3920970.38	102.344	102.431	102.428
				Packed Sand	0.087	0.084
157)	**221.FVA.PS.01**					
		571431.973	3916045.808	175.522	175.494	175.497
				Packed Sand	-0.028	-0.025
158)	**223.FVA.PS.01**					
		552815.166	3925728.176	344.885	344.897	344.913
				Packed Sand	0.012	0.027
159)	**225.FVA.PS.01**					
		539749.327	3914583.228	230.844	230.915	230.916
				Packed Sand	0.071	0.072
160)	**226.FVA.PS.01**					
		536413	3898216.655	104.679	104.682	104.712
				Packed Sand	0.003	0.033
161)	**227.FVA.PS.01**					
		532956.658	3893410.28	117.664	117.664	117.678
				Packed Sand	0	0.014

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
162)	**229.FVA.PS.01**					
		566956.416	3887407.266	139.442	139.464	139.464
				Packed Sand	0.022	0.022
163)	**230.FVA.PS.01**					
		571993.634	3882687.971	95.193	95.187	95.187
				Packed Sand	-0.006	-0.006
164)	**236.FVA.PS.01**					
		599411.488	3881099.304	72.967	72.975	72.978
				Packed Sand	0.008	0.011
165)	**242.FVA.PS.01**					
		615176.564	3872464.581	75.128	75.165	75.157
				Packed Sand	0.037	0.029
166)	**250.FVA.PS.01**					
		579649.404	3898494.105	132.494	132.5	132.512
				Packed Sand	0.006	0.018
167)	**252.FVA.PS.01**					
		540065.644	3902835.353	121.298	121.342	121.324
				Packed Sand	0.044	0.026
168)	**309.FVA.PS.01**					
		669782.75	3804623.874	57.438	57.475	57.472
				Packed Sand	0.037	0.034

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
169)	**310.FVA.PS.01**					
		663298.127	3804627.676	58.561	58.541	58.534
				Packed Sand	-0.02	-0.027
170)	**401.FVA.PS.01**					
		534754.055	3877605.038	95.395	95.396	95.404
				Packed Sand	0.001	0.009
171)	**406.FVA.PS.01**					
		518335.49	3873351.489	85.795	85.736	85.747
				Packed Sand	-0.059	-0.048
172)	**501.FVA.PS.02**					
		363522.101	3758027.245	100.317	100.301	100.318
				Packed Sand	-0.016	0.001
173)	**503.FVA.PS.01**					
		391864.248	3759793.905	131.508	131.562	131.56
				Packed Sand	0.054	0.052
174)	**507.FVA.PS.01**					
		457213.068	3743652.799	120.221	120.362	120.357
				Packed Sand	0.141	0.136
175)	**508.FVA.PS.01**					
		455195.233	3731436.045	85.353	85.351	85.359
				Packed Sand	-0.002	0.006

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
176)	☑	**509.FVA.PS.01**					
			444553.876	3725816.779	104.878	104.825	104.814
					Packed Sand	-0.053	-0.064
177)	☑	**511.FVA.PS.01**					
			455351.683	3714891.603	99.123	99.02	99.007
					Packed Sand	-0.103	-0.116
178)	☑	**513.FVA.PS.01**					
			442561.769	3707345.175	104.345	104.336	104.325
					Packed Sand	-0.009	-0.02
179)	☑	**515.FVA.PS.01**					
			411450.654	3742941.547	93.206	93.289	93.286
					Packed Sand	0.083	0.08
180)	☑	**516.FVA.PS.01**					
			394083.293	3745406.484	96.317	96.321	96.329
					Packed Sand	0.004	0.012
181)	☑	**517.FVA.PS.01**					
			393629.198	3734332.853	96.57	96.613	96.607
					Packed Sand	0.043	0.037
182)	☑	**519.FVA.PS.01**					
			363341.174	3733886.979	118.078	118.001	118.014
					Packed Sand	-0.077	-0.064

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
183)	**522.FVA.PS.01**					
		461506.507	3700564.419	110.128	110.085	110.089
				Packed Sand	-0.043	-0.039
184)	**523.FVA.PS.01**					
		403315.828	3712409.525	84.142	84.125	84.102
				Packed Sand	-0.017	-0.04
185)	**525.FVA.PS.01**					
		404423.794	3699039.107	87.982	87.998	87.983
				Packed Sand	0.016	0.001
186)	**526.FVA.PS.01**					
		418326.089	3693296.358	111.072	111.024	111.038
				Packed Sand	-0.048	-0.034
187)	**531.FVA.PS.01**					
		452167.897	3664235.164	73.121	73.115	73.104
				Packed Sand	-0.006	-0.017
188)	**532.FVA.PS.01**					
		453901.174	3654295.159	73.127	73.117	73.127
				Packed Sand	-0.01	0
189)	**533.FVA.PS.01**					
		436930.692	3654215.794	76.39	76.386	76.389
				Packed Sand	-0.004	-0.001

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
190)	**537.FVA.PS.01**					
		418025.181	3680684.939	93.06	93.137	93.14
				Packed Sand	0.077	0.08
191)	**538.FVA.PS.01**					
		415951.211	3661999.009	68.799	68.777	68.75
				Packed Sand	-0.022	-0.049
192)	**539.FVA.PS.01**					
		405323.087	3666328.382	107.652	107.653	107.65
				Packed Sand	0.001	-0.002
193)	**540.FVA.PS.01**					
		403241.155	3654887.799	82.218	82.115	82.11
				Packed Sand	-0.103	-0.108
194)	**573.FVA.PS.01**					
		370888.607	3732111.25	126.382	126.396	126.387
				Packed Sand	0.014	0.005
195)	**LC03.FVA.PS.01**					
		389861.443	3834033.603	330.163	330.171	330.176
				Packed Sand	0.008	0.013
196)	**LC11.FVA.PS.01**					
		422505.29	3797188.785	241.157	241.12	241.158
				Packed Sand	-0.037	0

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
197)	**LC14.FVA.PS.01**					
		436493.002	3770133.461	109.651	109.664	109.663
				Packed Sand	0.013	0.012
198)	**LC15.FVA.PS.01**					
		438201.852	3766051.297	113.838	113.904	113.944
				Packed Sand	0.066	0.106
199)	**LC29.FVA.PS.01**					
		370653.08	3768072.002	107.118	107.16	107.163
				Packed Sand	0.042	0.045
200)	**LC34.FVA.PS.01**					
		391084.038	3764102.282	111.776	111.823	111.805
				Packed Sand	0.047	0.029
201)	**LC36.FVA.PS.01**					
		432912.745	3789192.144	197.855	197.97	198.03
				Packed Sand	0.115	0.175
202)	**LC41.FVA.PS.01**					
		366597.194	3810853.386	319.001	319.056	319.03
				Packed Sand	0.055	0.029
203)	**LC42.FVA.PS.01**					
		373414.195	3816808.236	298.504	298.485	298.48
				Packed Sand	-0.019	-0.024

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
204) ☑	**LC46.FVA.PS.01**					
		435968.467	3797824.033	266.173	266.175	266.163
				Packed Sand	0.002	-0.01
205) ☑	**LC60.FVA.PS.01**					
		393527.107	3826445.536	311.565	311.552	311.542
				Packed Sand	-0.013	-0.023
206) ☑	**LC62.FVA.PS.01**					
		399523.168	3822415.908	293.077	293.036	293.046
				Packed Sand	-0.041	-0.031
207) ☑	**LC73.FVA.PS.01**					
		404117.84	3801663.67	353.97	353.821	353.852
				Packed Sand	-0.149	-0.118
208) ☑	**206.SVA.HV.01**					
		630397.126	3908668.943	75.718	75.472	75.512
				High Vegetation	-0.246	-0.206
209) ☑	**209.SVA.HV.01**					
		636912.756	3915818.78	69.307	69.133	69.167
				High Vegetation	-0.174	-0.14
210) ☑	**210.SVA.HV.01**					
		640287.602	3921208.938	76.14	76.034	76.017
				High Vegetation	-0.106	-0.123

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
211) ☑	**214.SVA.HV.01**					
		631385.544	3938568.656	172.652	172.605	172.605
				High Vegetation	-0.047	-0.047
212) ☑	**219.SVA.HV.01**					
		605248.433	3920979.639	102.255	102.23	102.233
				High Vegetation	-0.025	-0.022
213) ☑	**221.SVA.HV.01**					
		571434.475	3916060.735	175.116	175.126	175.125
				High Vegetation	0.01	0.009
214) ☑	**224.SVA.HV.01**					
		553712.862	3913776.644	208.551	208.495	208.509
				High Vegetation	-0.056	-0.042
215) ☑	**225.SVA.HV.01**					
		539759.268	3914604.3	231.255	231.382	231.374
				High Vegetation	0.127	0.119
216) ☑	**226.SVA.HV.01**					
		536368.464	3898255.502	106.283	106.282	106.296
				High Vegetation	-0.001	0.013
217) ☑	**229.SVA.HV.01**					
		566938.471	3887417.836	138.305	138.312	138.293
				High Vegetation	0.007	-0.012

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
218) ☑	**230.SVA.HV.01**					
		572030.641	3882677.763	94.713	94.745	94.761
				High Vegetation	0.032	0.048
219) ☑	**232.SVA.HV.01**					
		585656.39	3899715.354	187.948	188.054	188.056
				High Vegetation	0.106	0.108
220) ☑	**234.SVA.HV.01**					
		601805.725	3903463.834	112.886	112.777	112.798
				High Vegetation	-0.109	-0.088
221) ☑	**236.SVA.HV.01**					
		599414.943	3881127.399	73.181	73.173	73.175
				High Vegetation	-0.008	-0.006
222) ☑	**240.SVA.HV.01**					
		602775.927	3863417.182	81.118	81.171	81.167
				High Vegetation	0.053	0.049
223) ☑	**241.SVA.HV.01**					
		606303.351	3870974.494	70.106	70.13	70.112
				High Vegetation	0.024	0.006
224) ☑	**243.SVA.HV.01**					
		622748.535	3868433.925	64.88	65.032	65.024
				High Vegetation	0.152	0.144

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
225)	☑	**250.SVA.HV.01**					
			579676.509	3898511.182	132.418	132.403	132.404
					High Vegetation	-0.015	-0.014
226)	☑	**252.SVA.HV.01**					
			540021.046	3902861.285	122.981	123.006	122.978
					High Vegetation	0.025	-0.003
227)	☑	**253.SVA.HV.01**					
			548782.928	3917287.448	195.21	195.26	195.247
					High Vegetation	0.05	0.037
228)	☑	**255.SVA.HV.01**					
			561047.872	3926256.644	211.962	212.34	212.362
					High Vegetation	0.378	0.4
229)	☑	**256.SVA.HV.01**					
			570901.951	3926228.941	286.473	286.551	286.544
					High Vegetation	0.078	0.071
230)	☑	**302.SVA.HV.01**					
			648822.427	3825899.217	64.232	64.259	64.262
					High Vegetation	0.027	0.03
231)	☑	**303.SVA.HV.01**					
			662074.549	3812760.257	61.999	62.042	62.039
					High Vegetation	0.043	0.04

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
232) ☑	**304.SVA.HV.01**					
		652438.869	3795865.766	57.622	57.556	57.573
				High Vegetation	-0.066	-0.049
233) ☑	**305.SVA.HV.01**					
		650163.254	3766859.02	54.334	54.273	54.219
				High Vegetation	-0.061	-0.115
234) ☑	**308.SVA.HV.01**					
		659341.806	3779184.694	55.822	55.917	55.917
				High Vegetation	0.095	0.095
235) ☑	**310.SVA.HV.01**					
		663259.341	3804648.56	58.039	58.098	58.098
				High Vegetation	0.059	0.059
236) ☑	**401.SVA.HV.01**					
		534713.822	3877602.057	96.221	96.228	96.264
				High Vegetation	0.007	0.043
237) ☑	**402.SVA.HV.01**					
		530782.684	3870010.759	101.843	101.902	101.894
				High Vegetation	0.059	0.051
238) ☑	**405.SVA.HV.01**					
		517671.155	3865946.336	223.752	223.628	223.634
				High Vegetation	-0.124	-0.118

Coordinates and Offsets of Analyzed Locations (Continued)

	ID			Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
239)	**503.SVA.HV.01**					
		391874.211	3759766.748	130.863	130.862	130.861
				High Vegetation	-0.001	-0.002
240)	**504.SVA.HV.012**					
		420271.757	3756739.776	134.475	134.51	134.525
				High Vegetation	0.035	0.05
241)	**508.SVA.HV.01**					
		455152.882	3731361.94	86.683	86.766	86.753
				High Vegetation	0.083	0.07
242)	**509.SVA.HV.01**					
		444610.957	3725817.336	104.678	104.741	104.741
				High Vegetation	0.063	0.063
243)	**511.SVA.HV.01**					
		455321.967	3714877.586	98.036	97.975	97.99
				High Vegetation	-0.061	-0.046
244)	**513.SVA.HV.01**					
		442598.399	3707364.396	106.266	106.381	106.349
				High Vegetation	0.115	0.083
245)	**518.SVA.HV.01**					
		374977.847	3744236.416	102.689	102.674	102.668
				High Vegetation	-0.015	-0.021

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
246) ☑	**522.SVA.HV.01**					
		461473.687	3700560.808	108.637	108.647	108.63
				High Vegetation	0.01	-0.007
247) ☑	**524.SVA.HV.01**					
		411794.981	3708484.764	80.416	80.389	80.397
				High Vegetation	-0.027	-0.019
248) ☑	**525.SVA.HV.01**					
		404375.638	3699029.296	87.508	87.561	87.587
				High Vegetation	0.053	0.079
249) ☑	**532.SVA.HV.01**					
		453909.337	3654248.682	73.807	73.796	73.79
				High Vegetation	-0.011	-0.017
250) ☑	**534.SVA.HV.01**					
		438463.331	3662515.248	78.569	78.558	78.561
				High Vegetation	-0.011	-0.008
251) ☑	**536.SVA.HV.01**					
		429074.389	3676214.216	64.661	64.668	64.658
				High Vegetation	0.007	-0.003
252) ☑	**537.SVA.HV.01**					
		418064.989	3680683.423	92.774	92.846	92.838
				High Vegetation	0.072	0.064

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
253) ☑	**538.SVA.HV.01**					
		415982.443	3661999.617	68.397	68.42	68.429
				High Vegetation	0.023	0.032
254) ☑	**539.SVA.HV.01**					
		405347.581	3666287.697	106.743	106.767	106.791
				High Vegetation	0.024	0.048
255) ☑	**541.SVA.HV.01**					
		415925.956	3653913.424	74.795	74.795	74.809
				High Vegetation	0	0.014
256) ☑	**588.SVA.HV.01**					
		451169.769	3719834.812	113.681	113.623	113.63
				High Vegetation	-0.058	-0.051
257) ☑	**LC04.SVA.HV.01**					
		414502.259	3826854.622	275.614	275.601	275.607
				High Vegetation	-0.013	-0.007
258) ☑	**LC05.SVA.HV.01**					
		397135.919	3828039.361	314.545	314.464	314.47
				High Vegetation	-0.081	-0.075
259) ☑	**LC06.SVA.HV.01**					
		380679.99	3828461.2	332.138	332.215	332.183
				High Vegetation	0.077	0.045

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
260) ☑	**LC07.SVA.HV.01**					
		370675.994	3833947.278	303.073	303.076	303.075
				High Vegetation	0.003	0.002
261) ☑	**LC08.SVA.HV.01**					
		394060.757	3837316.26	390.358	390.315	390.3
				High Vegetation	-0.043	-0.058
262) ☑	**LC12.SVA.HV.01**					
		440364.585	3792116.609	198.496	198.556	198.57
				High Vegetation	0.06	0.074
263) ☑	**LC13.SVA.HV.01**					
		441884.283	3782110.15	203.139	203.193	203.25
				High Vegetation	0.054	0.111
264) ☑	**LC14.SVA.HV.01**					
		436528.177	3770158.817	109.424	109.373	109.392
				High Vegetation	-0.051	-0.032
265) ☑	**LC18.SVA.HV.01**					
		412724.283	3764762.626	180.992	181.101	181.153
				High Vegetation	0.109	0.161
266) ☑	**LC21.SVA.HV.01**					
		413661.909	3792276.256	267.928	268.003	268.055
				High Vegetation	0.075	0.127

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
267)	☑	LC22.SVA.HV.01					
			414539.703	3797138.329	283.792	283.794	283.786
					High Vegetation	0.002	-0.006
268)	☑	LC23.SVA.HV.01					
			403784.951	3794018.039	272.418	272.435	272.405
					High Vegetation	0.017	-0.013
269)	☑	LC30.SVA.HV.01					
			364669.926	3780716.085	232.249	232.461	232.464
					High Vegetation	0.212	0.215
270)	☑	LC36.SVA.HV.01					
			432880.204	3789264.133	192.775	192.778	192.78
					High Vegetation	0.003	0.005
271)	☑	LC38.SVA.HV.01					
			397939.617	3803162.962	334.663	334.643	334.647
					High Vegetation	-0.02	-0.016
272)	☑	LC40.SVA.HV.01					
			406315.757	3818094.36	328.795	328.836	328.835
					High Vegetation	0.041	0.04
273)	☑	LC41.SVA.HV.01					
			366611.756	3810839.721	317.482	317.553	317.56
					High Vegetation	0.071	0.078

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
274) ☑	**LC42.SVA.HV.01**					
		373398.679	3816813.949	297.944	297.907	297.946
				High Vegetation	-0.037	0.002
275) ☑	**LC47.SVA.HV.01**					
		405264.423	3784429.54	189.106	189.205	189.2
				High Vegetation	0.099	0.094
276) ☑	**LC62.SVA.HV.01**					
		399504.914	3822425.035	292.247	292.178	292.195
				High Vegetation	-0.069	-0.052
277) ☑	**LC63.SVA.HV.01**					
		410309.052	3829987.443	308.149	308.122	308.093
				High Vegetation	-0.027	-0.056
278) ☑	**LC71.SVA.HV.01**					
		370384.472	3809161.457	313.04	313.011	313.04
				High Vegetation	-0.029	0
279) ☑	**LC72.SVA.HV.01**					
		374431.476	3805140.873	328.456	328.398	328.4
				High Vegetation	-0.058	-0.056
280) ☑	**LC73.SVA.HV.01**					
		404121.509	3801680.147	354.428	354.338	354.331
				High Vegetation	-0.09	-0.097

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
281) ☑	**206.SVA.LV.01**					
		630415.567	3908662.894	75.152	75.048	75.063
				Low Vegetation	-0.104	-0.09
282) ☑	**208.SVA.LV.01**					
		625709.483	3905920.445	73.295	73.318	73.3
				Low Vegetation	0.023	0.005
283) ☑	**224.SVA.LV.01**					
		553690.899	3913787.119	208.213	208.326	208.32
				Low Vegetation	0.113	0.107
284) ☑	**224.SVA.LV.02**					
		553690.904	3913787.118	208.197	208.326	208.32
				Low Vegetation	0.129	0.123
285) ☑	**225.SVA.LV.01**					
		539799.377	3914608.162	230.741	230.817	230.813
				Low Vegetation	0.076	0.071
286) ☑	**230.SVA.LV.01**					
		572006.71	3882695.735	94.679	94.846	94.82
				Low Vegetation	0.167	0.141
287) ☑	**231.SVA.LV.01**					
		583116.286	3885494.183	85.482	85.613	85.605
				Low Vegetation	0.131	0.123

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
288)	**238.SVA.LV.01**					
		591541.308	3872231.107	78.427	78.536	78.532
				Low Vegetation	0.109	0.105
289)	**240.SVA.LV.01**					
		602768.56	3863371.248	81.792	81.862	81.878
				Low Vegetation	0.07	0.085
290)	**243.SVA.LV.01**					
		622773.985	3868421.321	64.755	64.942	64.931
				Low Vegetation	0.187	0.176
291)	**255.SVA.LV.01**					
		561074.247	3926244.706	211.038	211.378	211.4
				Low Vegetation	0.34	0.362
292)	**309.SVA.LV.01**					
		669735.329	3804645.066	56.62	56.772	56.793
				Low Vegetation	0.152	0.173
293)	**511.SVA.LV.01**					
		455302.31	3714867.7	97.769	97.784	97.793
				Low Vegetation	0.015	0.023
294)	**512.SVA.LV.01**					
		424586.39	3719355.596	78.429	78.541	78.564
				Low Vegetation	0.112	0.135

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
295)	**516.SVA.LV.01**					
		394069.567	3745353.646	94.416	94.519	94.531
				Low Vegetation	0.103	0.115
296)	**520.SVA.LV.01**					
		395482.55	3725918.041	100.4	100.646	100.64
				Low Vegetation	0.246	0.24
297)	**526.SVA.LV.01**					
		418339.502	3693315.534	110.479	110.544	110.547
				Low Vegetation	0.065	0.068
298)	**527.SVA.LV.01**					
		434055.088	3691100.385	72.049	72.111	72.147
				Low Vegetation	0.062	0.098
299)	**536.SVA.LV.01**					
		429066.122	3676241.489	64.882	64.913	64.92
				Low Vegetation	0.031	0.038
300)	**538.SVA.LV.01**					
		415954.162	3661925.986	68.527	68.564	68.583
				Low Vegetation	0.037	0.056
301)	**539.SVA.LV.01**					
		405324.307	3666304.436	107.176	107.289	107.29
				Low Vegetation	0.113	0.114

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
302)	**541.SVA.LV.01**					
		415923.769	3653903.34	75.232	75.252	75.243
				Low Vegetation	0.02	0.01
303)	**LC19.SVA.LV.01**					
		411828.896	3784470.426	233.926	233.958	233.92
				Low Vegetation	0.032	-0.006
304)	**LC26.SVA.LV.01**					
		379006.839	3777078.52	186.289	186.047	186.057
				Low Vegetation	-0.242	-0.232
305)	**LC40.SVA.LV.01**					
		406315.188	3818099.657	328.782	328.762	328.794
				Low Vegetation	-0.02	0.012
306)	**210.SVA.MV.01**					
		640291.763	3921194.695	75.993	75.832	75.834
				Medium Vegetation	-0.161	-0.159
307)	**211.SVA.MV.01**					
		645094.18	3928755.007	76.464	76.333	76.32
				Medium Vegetation	-0.131	-0.144
308)	**218.SVA.MV.01**					
		612210.8	3927988.603	202.213	202.229	202.265
				Medium Vegetation	0.016	0.052

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
309) ☑	**223.SVA.MV.01**					
		552887.333	3925682.837	345.001	345.041	345.053
				Medium Vegetation	0.04	0.052
310) ☑	**225.SVA.MV.01**					
		539775.809	3914614.465	231.457	231.617	231.593
				Medium Vegetation	0.16	0.136
311) ☑	**228.SVA.MV.01**					
		555512.267	3893815.888	104.476	104.747	104.711
				Medium Vegetation	0.271	0.235
312) ☑	**230.SVA.MV.01**					
		572021.691	3882685.919	94.62	94.778	94.731
				Medium Vegetation	0.158	0.111
313) ☑	**231.SVA.MV.01**					
		583130.13	3885475.778	85.429	85.476	85.474
				Medium Vegetation	0.047	0.045
314) ☑	**237.SVA.MV.01**					
		607448.557	3888628.236	72.759	72.76	72.77
				Medium Vegetation	0.001	0.011
315) ☑	**238.SVA.MV.01**					
		591551.262	3872220.798	78.36	78.427	78.43
				Medium Vegetation	0.067	0.07

Coordinates and Offsets of Analyzed Locations (Continued)

	ID			Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
316)	**239.SVA.MV.01**					
		593336.589	3858871.16	81.537	81.538	81.505
				Medium Vegetation	0.001	-0.032
317)	**242.SVA.MV.01**					
		615187.95	3872527.707	75.752	75.726	75.742
				Medium Vegetation	-0.026	-0.01
318)	**243.SVA.MV.01**					
		622765.421	3868434.477	64.825	64.961	64.958
				Medium Vegetation	0.136	0.133
319)	**303.SVA.MV.01**					
		662061.247	3812739.972	61.88	61.99	61.981
				Medium Vegetation	0.11	0.101
320)	**312.SVA.MV.01**					
		657638.269	3798472.313	50.98	51.089	51.074
				Medium Vegetation	0.109	0.094
321)	**404.SVA.MV.01**					
		522759.727	3868403.219	94.481	94.508	94.535
				Medium Vegetation	0.027	0.054
322)	**405.SVA.MV.01**					
		517673.917	3865927.637	224.57	224.51	224.509
				Medium Vegetation	-0.06	-0.061

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
323)	☑	**406.SVA.MV.01**					
			518311.366	3873356.036	85.872	85.944	85.887
					Medium Vegetation	0.072	0.015
324)	☑	**407.SVA.MV.01**					
			527929.623	3876716.636	95.858	95.95	95.95
					Medium Vegetation	0.092	0.092
325)	☑	**501.SVA.MV.01**					
			363541.913	3758034.387	100.868	100.967	100.965
					Medium Vegetation	0.099	0.097
326)	☑	**504.SVA.MV.01**					
			420286.664	3756768.131	135.383	135.488	135.486
					Medium Vegetation	0.105	0.103
327)	☑	**507.SVA.MV.01**					
			457244.965	3743609.165	120.288	120.256	120.257
					Medium Vegetation	-0.032	-0.031
328)	☑	**510.SVA.MV.01**					
			433459.181	3745574.176	117.67	117.761	117.779
					Medium Vegetation	0.091	0.109
329)	☑	**514.SVA.MV.01**					
			416903.373	3734346.806	121.208	121.159	121.176
					Medium Vegetation	-0.049	-0.032

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
330)	☑	**515.SVA.MV.01**					
			411445.445	3742911.621	92.961	93.104	93.086
					Medium Vegetation	0.143	0.125
331)	☑	**517.SVA.MV.01**					
			393599.381	3734369.182	96.034	96.093	96.098
					Medium Vegetation	0.059	0.064
332)	☑	**518.SVA.MV.01**					
			375013.951	3744264.918	102.093	102.179	102.157
					Medium Vegetation	0.086	0.064
333)	☑	**519.SVA.MV.01**					
			363315.481	3733894.671	119.01	118.925	118.938
					Medium Vegetation	-0.085	-0.072
334)	☑	**520.SVA.MV.01**					
			395490.163	3725894.408	100.422	100.468	100.462
					Medium Vegetation	0.046	0.04
335)	☑	**521.SVA.MV.01**					
			369191.15	3715533.979	93.733	93.695	93.715
					Medium Vegetation	-0.038	-0.018
336)	☑	**524.SVA.MV.01**					
			411788.404	3708442.573	79.952	80.092	80.06
					Medium Vegetation	0.14	0.108

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
337)	☑	**525.SVA.MV.01**					
			404416.783	3699030.671	87.98	88.057	88.043
					Medium Vegetation	0.077	0.063
338)	☑	**530.SVA.MV.01**					
			450303.424	3680249.647	91.92	92.046	92.06
					Medium Vegetation	0.126	0.14
339)	☑	**533.SVA.MV.01**					
			436895.142	3654264.962	75.549	75.606	75.551
					Medium Vegetation	0.057	0.002
340)	☑	**537.SVA.MV.01**					
			418093.047	3680688.138	93.117	93.169	93.126
					Medium Vegetation	0.052	0.009
341)	☑	**539.SVA.MV.01**					
			405348.194	3666279.157	106.524	106.511	106.498
					Medium Vegetation	-0.013	-0.026
342)	☑	**541.SVA.MV.01**					
			415915.799	3653904.803	75.559	75.541	75.541
					Medium Vegetation	-0.018	-0.018
343)	☑	**LC03.SVA.MV.01**					
			389876.498	3834000.191	329.968	329.959	329.96
					Medium Vegetation	-0.009	-0.008

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
344) ☑	**LC11.SVA.MV.01**					
		422496.356	3797168.628	241.828	241.863	241.934
				Medium Vegetation	0.035	0.106
345) ☑	**LC12.SVA.MV.01**					
		440364.64	3792081.674	197.105	197.202	197.165
				Medium Vegetation	0.097	0.06
346) ☑	**LC16.SVA.MV.01**					
		429818.798	3764976.875	171.464	171.487	171.497
				Medium Vegetation	0.023	0.033
347) ☑	**LC23.SVA.MV.01**					
		403804.586	3794015.944	271.036	270.993	271.015
				Medium Vegetation	-0.043	-0.021
348) ☑	**LC28.SVA.MV.01**					
		364327.32	3765006.804	104.631	104.617	104.595
				Medium Vegetation	-0.014	-0.036
349) ☑	**LC30.SVA.MV.01**					
		364673.813	3780727.258	232.087	232.159	232.293
				Medium Vegetation	0.072	0.206
350) ☑	**LC32.SVA.MV.01**					
		406242.757	3775685.644	129.277	129.621	129.67
				Medium Vegetation	0.344	0.393

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
351) ☑	**LC34.SVA.MV.01**					
		391152.88	3764144.745	112.417	112.512	112.513
				Medium Vegetation	0.095	0.095
352) ☑	**LC35.SVA.MV.01**					
		424941.053	3777252.828	165.28	165.359	165.33
				Medium Vegetation	0.079	0.05
353) ☑	**LC40.SVA.MV.01**					
		406309.501	3818120.047	328.556	328.556	328.5
				Medium Vegetation	0	-0.056
354) ☑	**LC43.SVA.MV.01**					
		377249.047	3823849.922	286.476	286.412	286.427
				Medium Vegetation	-0.064	-0.049
355) ☑	**LC46.SVA.MV.01**					
		435958.202	3797825.471	265.701	265.784	265.77
				Medium Vegetation	0.083	0.069
356) ☑	**LC60.SVA.MV.01**					
		393505.112	3826438.219	311.414	311.37	311.388
				Medium Vegetation	-0.044	-0.026
357) ☑	**LC65.SVA.MV.01**					
		389481.988	3830338.485	340.561	340.647	340.58
				Medium Vegetation	0.086	0.019

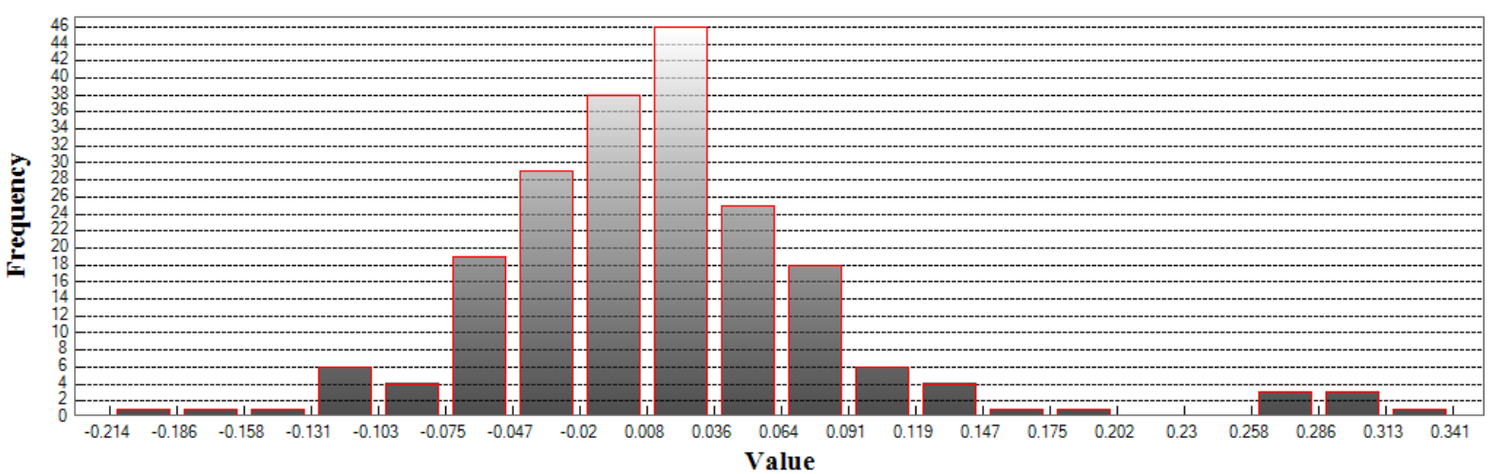
Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	**Survey Y**	**Z1**	**Z DEM**	**Z LAS**
				LC Type	**ΔZ DEM**	**ΔZ LAS**
358) ☑	**LC71.SVA.MV.01**					
		370409.207	3809158.604	314.233	314.217	314.201
				Medium Vegetation	-0.016	-0.032

LAS

Nonvegetated Vertical Accuracy
LandCover Type: Bare Ground, Hard Pavement, Packed Sand
Minimum DZ: -0.214
Maximum DZ: 0.341
Mean DZ: 0.016
Mean Magnitude DZ: 0.23
Number Observations: 207
Standard Deviation DZ: 0.077
RMSE Z: 0.079
95% Confidence Level Z: 0.154
Units: Meters

Histogram



Min: -0.214
Max: 0.341
Number Of Bins: 20
Bin Interval: 0.028

LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: High Vegetation

Minimum DZ: -0.206

Maximum DZ: 0.4

Mean DZ: 0.016

Mean Magnitude DZ: 0.246

Number Observations: 73

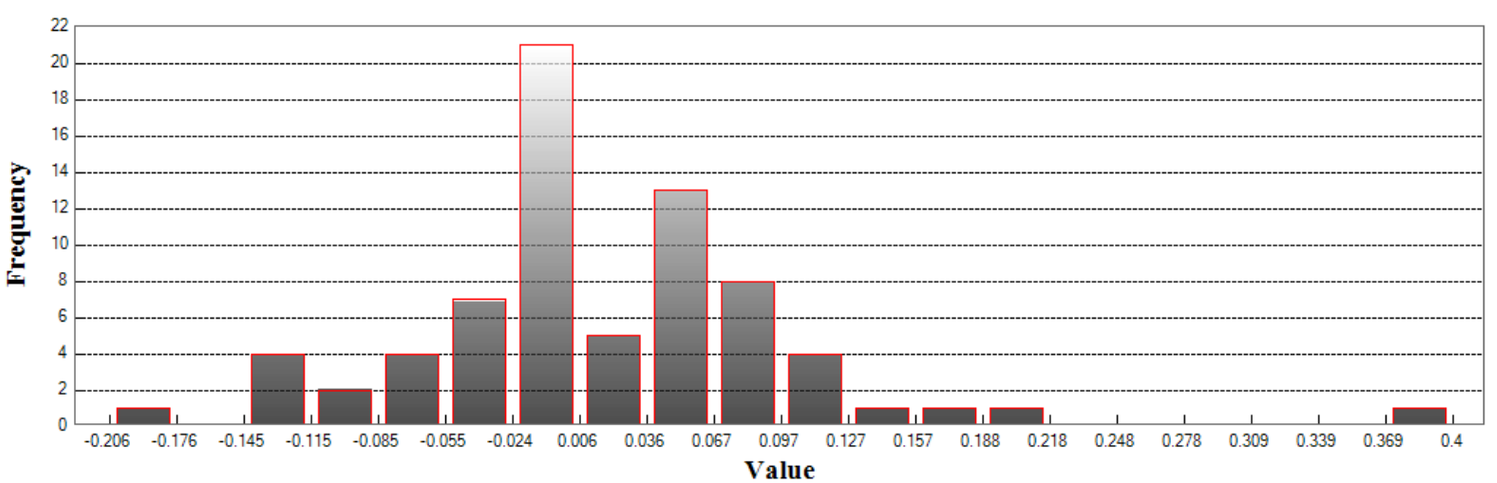
Standard Deviation DZ: 0.086

RMSE Z: 0.087

95th Percentile: 0.144

Units: Meters

Histogram



Min: -0.206

Max: 0.4

Number Of Bins: 20

Bin Interval: 0.03

LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: Low Vegetation

Minimum DZ: -0.232

Maximum DZ: 0.362

Mean DZ: 0.082

Mean Magnitude DZ: 0.329

Number Observations: 25

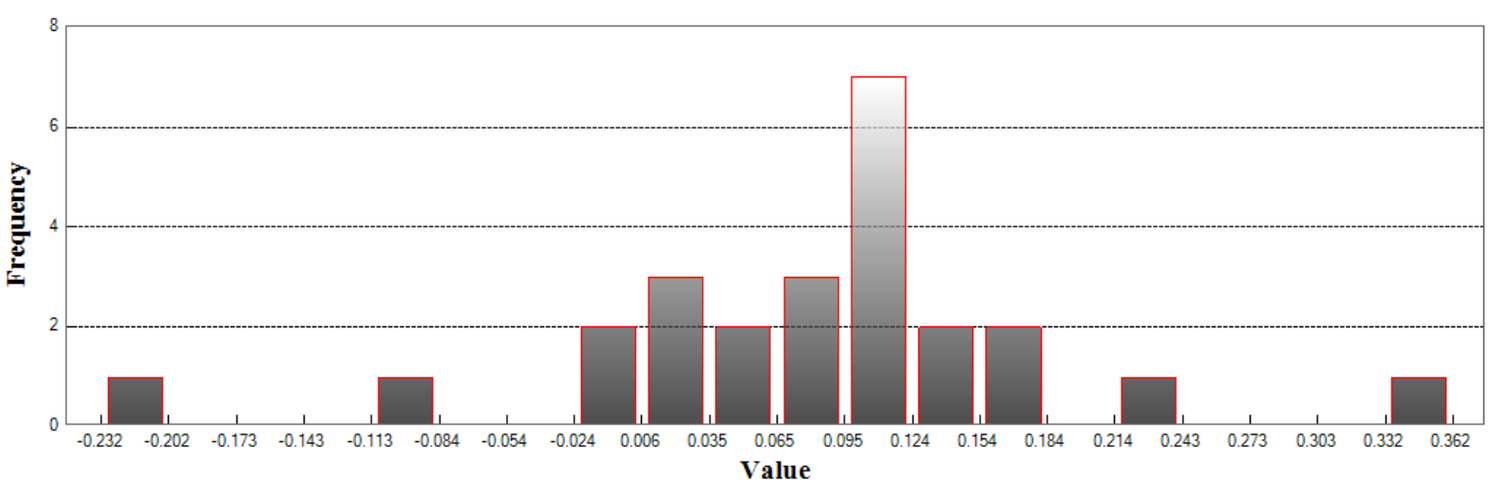
Standard Deviation DZ: 0.11

RMSE Z: 0.136

95th Percentile: 0.24

Units: Meters

Histogram



Min: -0.232

Max: 0.362

Number Of Bins: 20

Bin Interval: 0.03

LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: Medium Vegetation

Minimum DZ: -0.159

Maximum DZ: 0.393

Mean DZ: 0.044

Mean Magnitude DZ: 0.274

Number Observations: 53

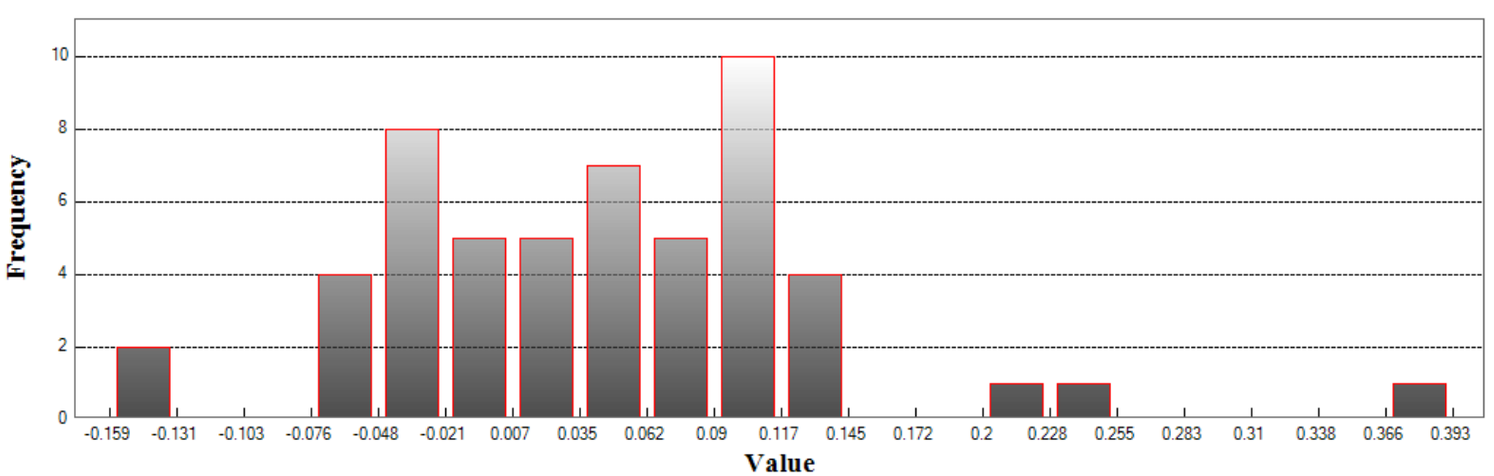
Standard Deviation DZ: 0.091

RMSE Z: 0.101

95th Percentile: 0.159

Units: Meters

Histogram



Min: -0.159

Max: 0.393

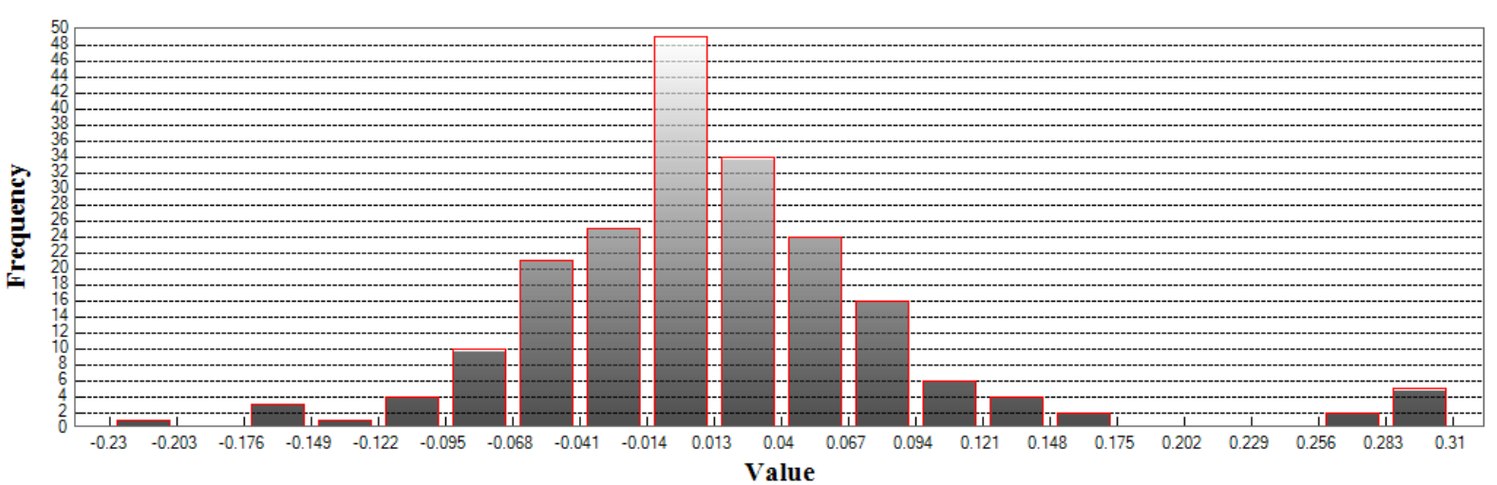
Number Of Bins: 20

Bin Interval: 0.028

DEM

Nonvegetated Vertical Accuracy
LandCover Type: Bare Ground, Hard Pavement, Packed Sand
Minimum DZ: -0.229
Maximum DZ: 0.311
Mean DZ: 0.015
Mean Magnitude DZ: 0.232
Number Observations: 207
Standard Deviation DZ: 0.078
RMSE Z: 0.079
95% Confidence Level Z: 0.156
Units: Meters

Histogram



Min: -0.229
Max: 0.311
Number Of Bins: 20
Bin Interval: 0.027

DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: High Vegetation

Minimum DZ: -0.246

Maximum DZ: 0.378

Mean DZ: 0.012

Mean Magnitude DZ: 0.245

Number Observations: 73

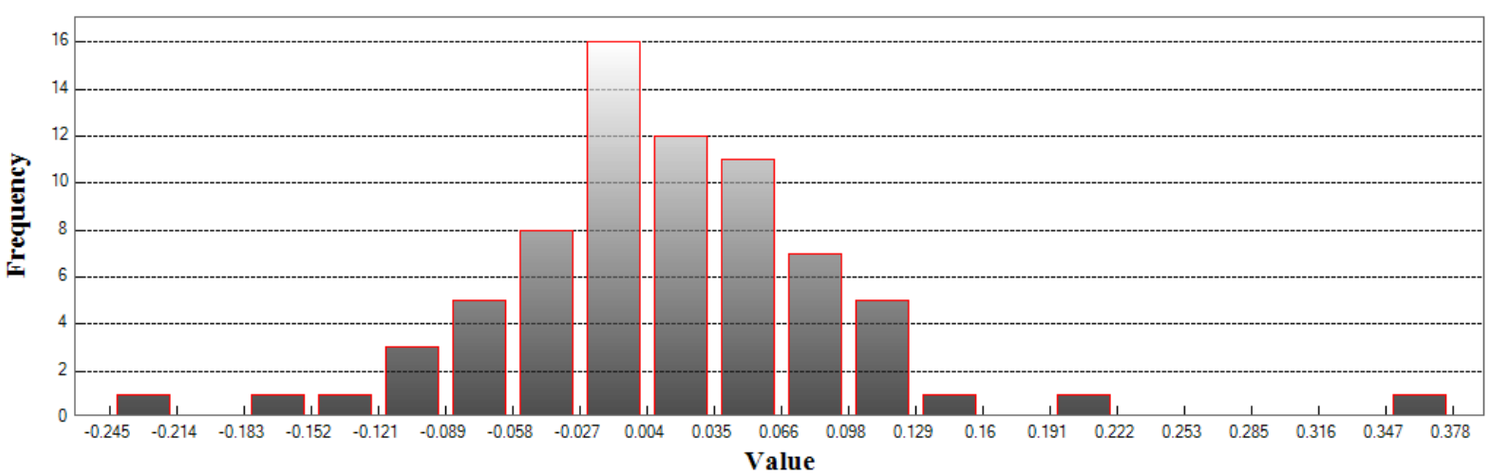
Standard Deviation DZ: 0.085

RMSE Z: 0.086

95th Percentile: 0.152

Units: Meters

Histogram



Min: -0.246

Max: 0.378

Number Of Bins: 20

Bin Interval: 0.031

DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: Low Vegetation

Minimum DZ: -0.242

Maximum DZ: 0.34

Mean DZ: 0.079

Mean Magnitude DZ: 0.329

Number Observations: 25

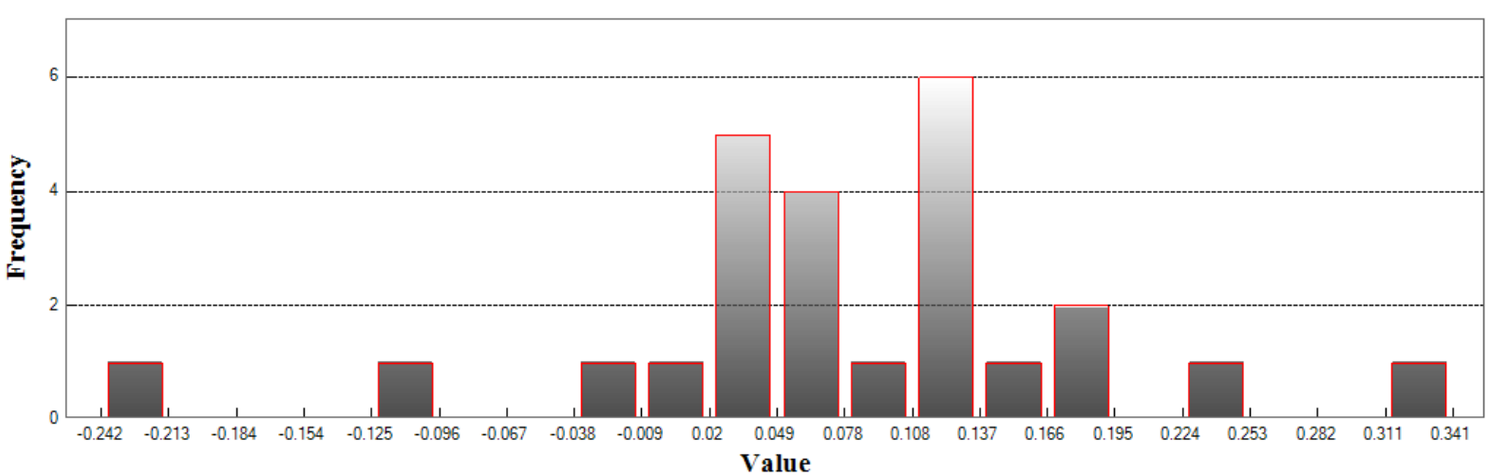
Standard Deviation DZ: 0.111

RMSE Z: 0.134

95th Percentile: 0.246

Units: Meters

Histogram



Min: -0.242

Max: 0.34

Number Of Bins: 20

Bin Interval: 0.029

DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: Medium Vegetation

Minimum DZ: -0.161

Maximum DZ: 0.344

Mean DZ: 0.047

Mean Magnitude DZ: 0.278

Number Observations: 53

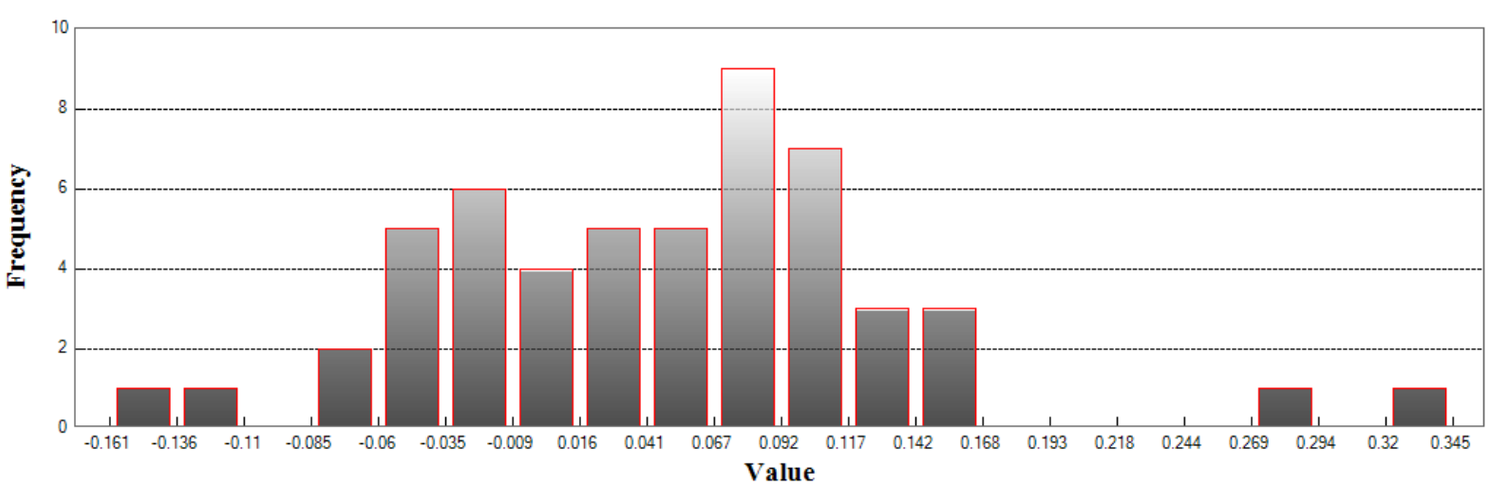
Standard Deviation DZ: 0.089

RMSE Z: 0.1

95th Percentile: 0.16

Units: Meters

Histogram



Min: -0.161

Max: 0.344

Number Of Bins: 20

Bin Interval: 0.025